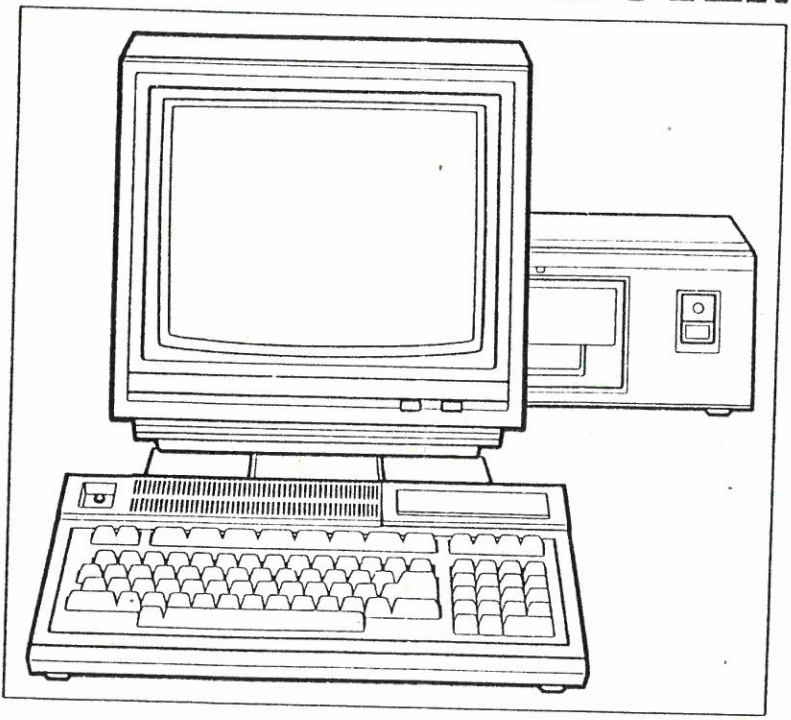
TOSHIBA

T100 PERSONAL COMPUTER



MAINTENANCE MANUAL

PREFACE

This Maintenance Manual presents important technical information for the performance of field maintenance on the T100 Personal Computer. The procedures contained are directed toward the efficient repair of end/user problems in accordance with a modular repair philosophy.

NOTICE

The following maintenance instructions are for use by qualified service personnel only. To avoid possible injury, do not attempt any repairs other than those defined in this manual.

CAUTION

Dangerous voltages exist in the fuse and transformer circuits of the T100 Personal Computer. Keep the AC cable disconnected while working in those areas.

Turn off the power switch before removing or installing circuit boards or other units.

Avoid the use of cleaning agents which contain benzene, toluene, xylene, acetone, or other similar solvents. Cleaners which contain these chemicals will damage the cabinets of the T100 Personal Computer and may damage other parts as well.

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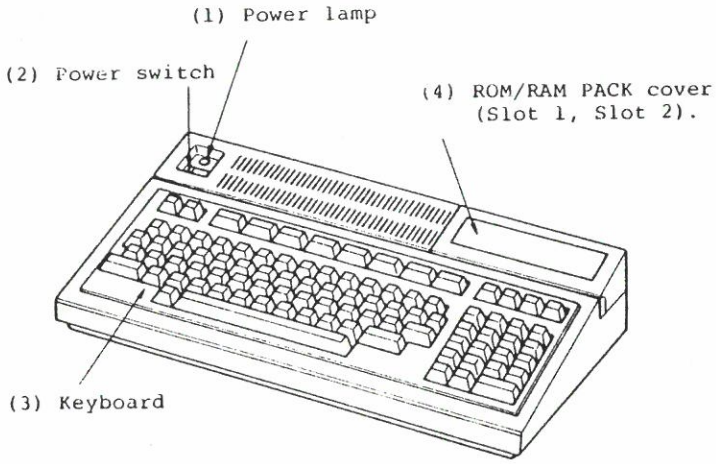
1. GENERAL DESCRIPTION

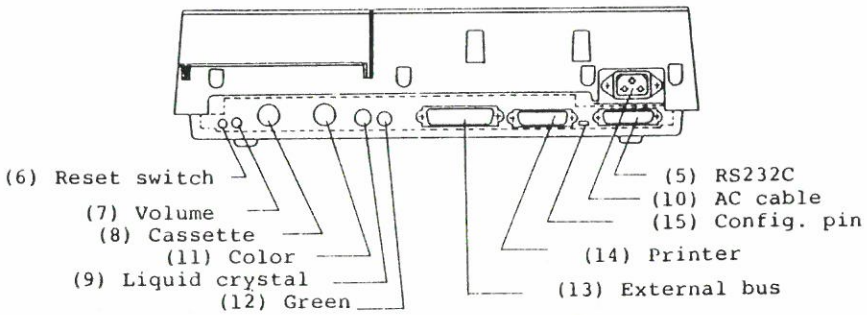
The T100 is a personal/professional computer to be used by businessmen, scientists, engineers and students for computing, planning, information management and reports.

The T100 is a modular hardware and software system which will allow even the most novice of programmers to begin computing with a CPU/Keyboard and then expand into a larger system.

1.1 CPU/Keyboard



T100 Top View



T100 Rear View

Figure 1.1.1 External View

Table 1.1.1 External View - Key

DESCRIPTION	FUNCTION
(1) Power lamp	Lights when power switch is turned ON.
(2) Power switch	OFF: Power is not supplied to T100. ON: Power is supplied to T100. (Power lamp lights.)
(3) Keyboard	89 keys for alphanumeric and graphic input into the T100 Personal Computer.
(4) PACK cover	Cover for PACK slots, can be opened and closed. Slot 1: Insert ROM PACK. Slot 2: Insert ROM PACK or RAM PACK.
(5) RS232C	Connector for RS232C interface devices.
(6) Reset switch	The T100 is initialized when this switch is depressed.
(7) Volume	The speaker volume can be adjusted by turning this volume knob.
(8) Cassette	Connector for audio casette tape recorder.
(9) Liquid crystal	Connector for liquid crystal display.
(10) AC cable	Cord for supplying power to the T100. Insert the plug into a 115V AC outlet. (220/240V in Europe)

(11) Color — Connector for color display.

(12) Green — Connector for the green monochrome display.

(13) External bus — Connector for the expansion unit or the floppy disk drive unit.

(14) Printer — Connector for the printer unit.

(15) Config. pin — Open: Background color is applied to the whole display area.
Short: Background color is applied to the character display area only.

The T100 CPU/Keyboard is composed of a CPU board, keyboard, power supply and cover. The internal structure of the T100 is shown in Figure 1.1.2.

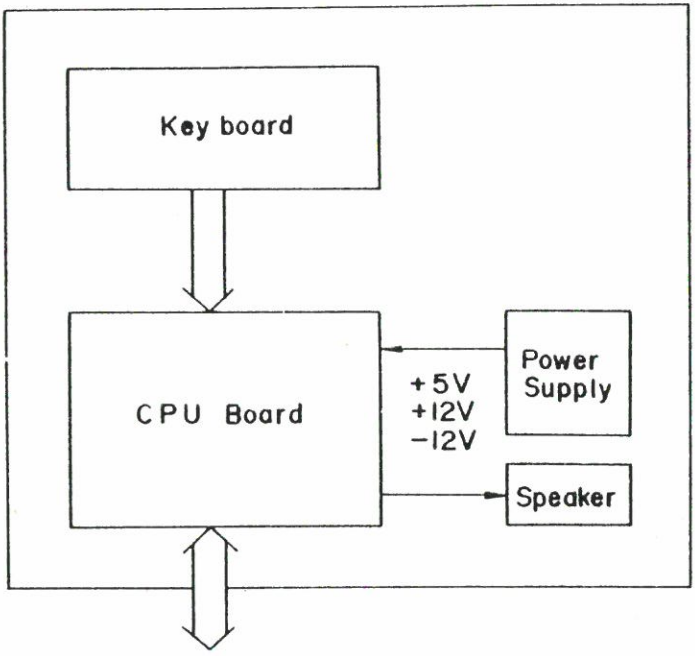


Figure 1.1.2 Internal Structure of the T100

1.1.1 CPU Board

The CPU board is composed of the microprocessor, memory and controls. The external view of the CPU Board is shown in Figure 1.1.3.

The CPU employs a Z-80A as the microprocessor with a 3.993 Mhz clock.

There are three types of memory are built into the T100:

1. Main memory (RAM) 64K bytes
2. Main memory (ROM1 to ROM4) 32K bytes
3. Video memory (V-RAM) 16K words

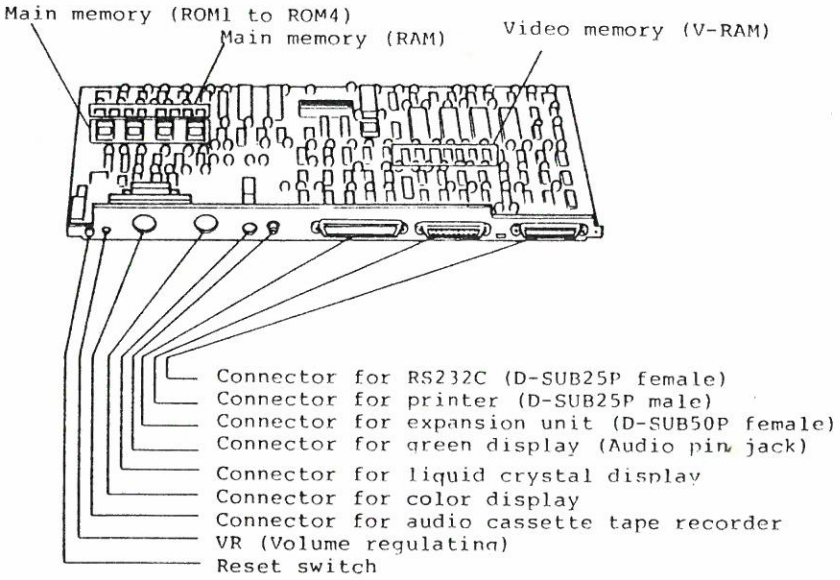

Main memory (ROM1 to ROM4)
Main memory (RAM)
Video memory (V-RAM)
Connector for RS232C (D-SUB25P female)
Connector for printer (D-SUB25P male)
Connector for expansion unit (D-SUB50P female)
Connector for green display (Audio pin jack)
Connector for liquid crystal display
Connector for color display
Connector for audio cassette tape recorder
VR (Volume regulating)
Reset switch

Figure 1.1.3 The CPU Board

1.1.2 Keyboard

The keyboard is composed of 89 keys. The key array and shift status transitions are shown in Figure 1.1.4 and Figure 1.1.5, respectively.

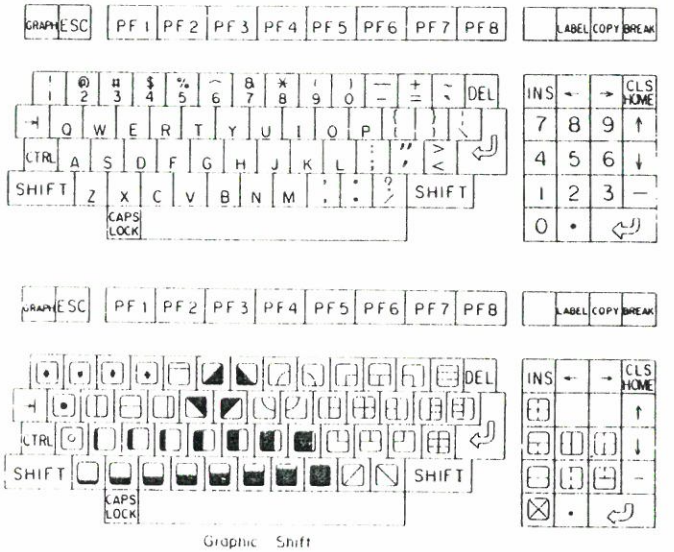
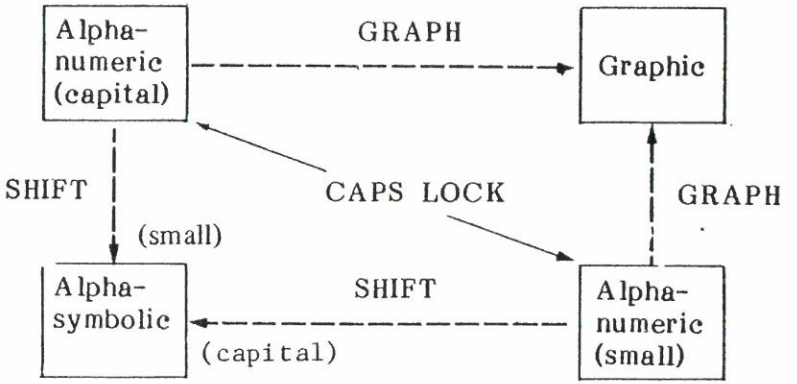


Figure 1.1.4 Layout of the Keyboard



The line ←——→ indicates alternate shift status transitions.
The lines ←·····→ indicate level shift status transitions.

Figure 1.1.5 Keyboard Shift Status Transition Diagram

1.1.3 Power Supply

The power supply unit receives 115V or 220-240V AC (European version) and supplies DC voltages to the CPU board. The output of the power supply cannot be adjusted.

U.S. specifications:

AC input	115V (97.8 to 126.5V AC), 60Hz ± 0.5Hz
Output voltage	+ 5V DC = + 5V ± 0.25V, 2.6 A +12V DC = +12V ± 0.6V, 0.28A -12V DC = -12V ± 0.6V, 0.1A

European specifications:

AC input	220-240V (187 to 264V AC), 50Hz ±0.5Hz
Output voltage	+ 5V DC = + 5V ±0.25V, 2.6A +12V DC = +12V ±0.6V, 0.28A -12V DC = -12V ±0.6V, 0.1A

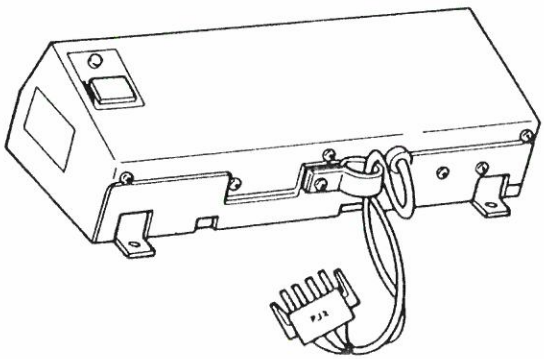


Figure 1.1.6 The Power Supply

1.2 Floppy Disk Drive Unit (FDD)

The FDD stores and retrieves data for the T100 CPU/Keyboard through the control board on dual 5 1/4-inch floppy disk drives.

The external view of the FDD is shown in Figure 1.2.1, and the function of each unit is shown in Table 1.2.1.

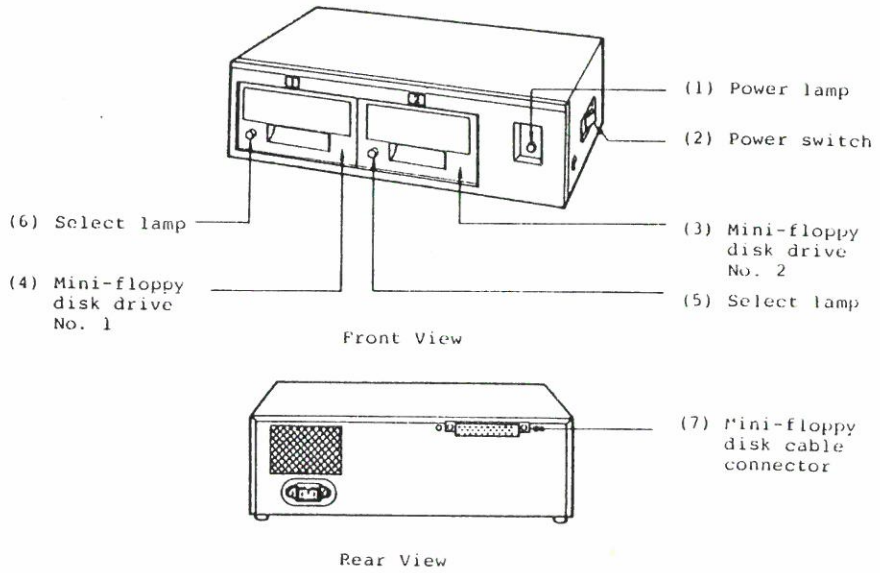


Figure 1.2.1 External View

Table 1.2.1 External View - Key

DESCRIPTION	FUNCTION
(1) Power lamp	Lights when power switch is turned ON.
(2) Power switch	OFF: Power is not supplied to the FDD. ON: Power is supplied to the FDD. (Power lamp lights.)
(3) Drive 1/A	Floppy disk drive to write data onto or to read data from a 5 1/4" floppy disk.
(4) Drive 2/B	Floppy disk drive to write data onto or to read data from a 5 1/4" floppy disk.
(5) Select lamp 1	Lights when Drive 1/A is being accessed.
(6) Select lamp 2	Lights when Drive 2/B is being accessed.
(7) Cable connector	Connector to connect the FDD to the T100 CPU/Keybourd (Connector PJ1)

The FDD is composed of two floppy disk drives, an FDD Controller and a power supply. The floppy disk drive unit schematic is shown in Figure 1.2.2, and the cable connections are shown in Figure 1.2.3.

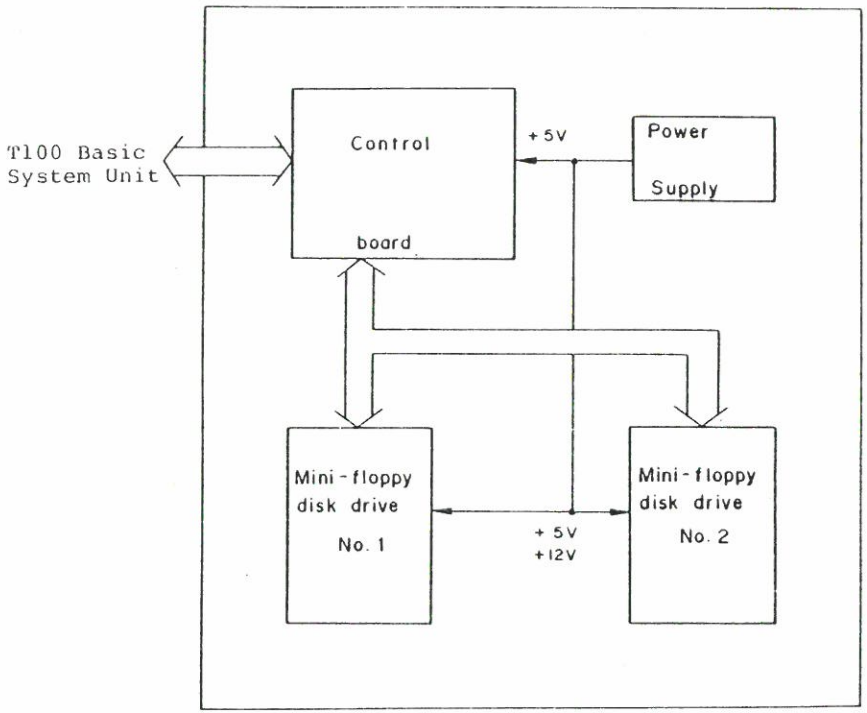


Figure 1.2.2 Floppy Disk Drive Unit Schematic

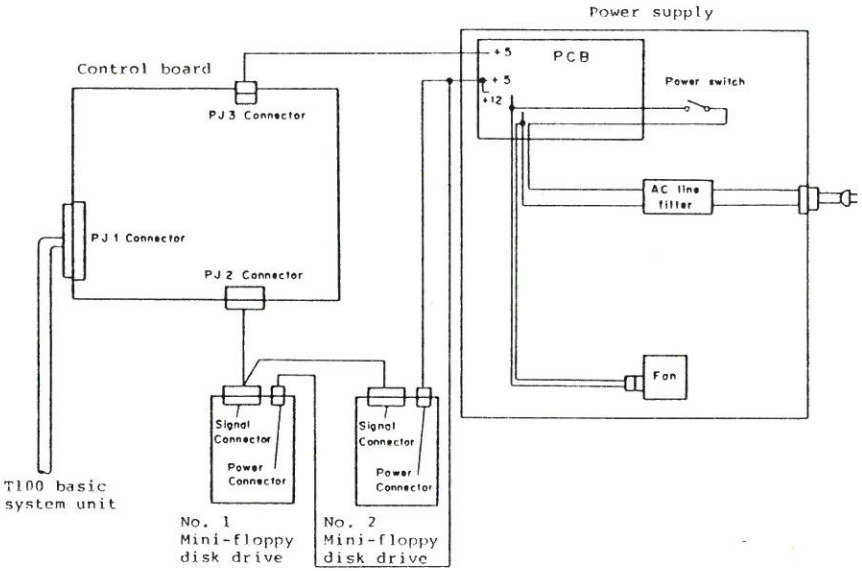


Figure 1.2.3 Cable Connections

1.2.1 Floppy Disk Drive Unit (FDD)

The FDD writes data from the T100 CPU/Keyboard onto floppy disks or reads data from floppy disks. The floppy disk drive is composed of a mechanical section and a control board. (Refer to Figure 1.2.4.)

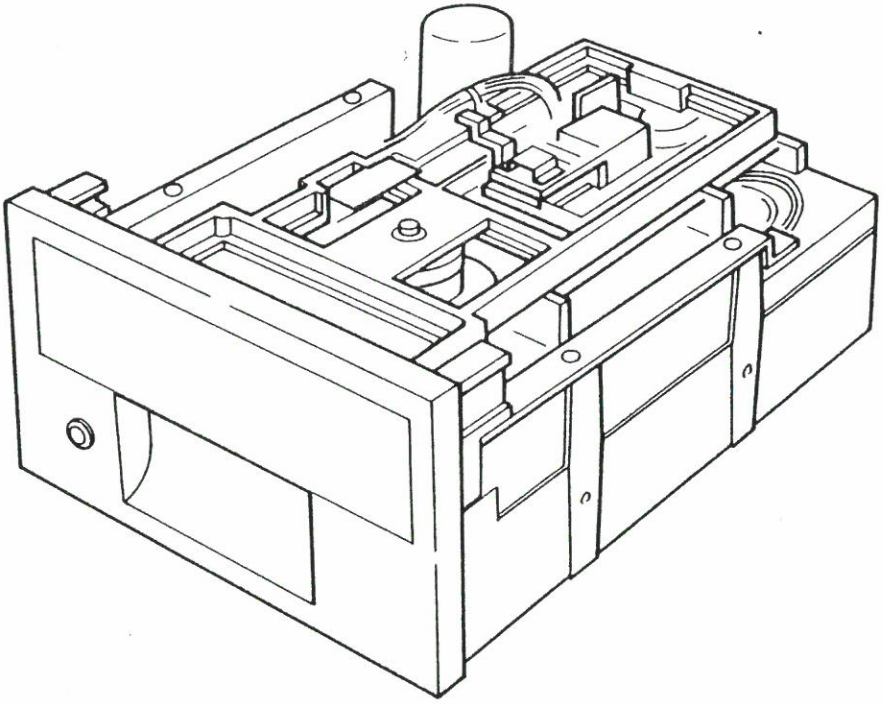


Figure 1.2.4 Floppy Disk Drive Unit

1.2.2 FDD Controller

The FDD Controller interfaces between the T100 CPU/Keyboard and the floppy disk drives to control the reading and writing of programs and data. A maximum of two floppy disk drives can be interfaced to one FDD Controller.

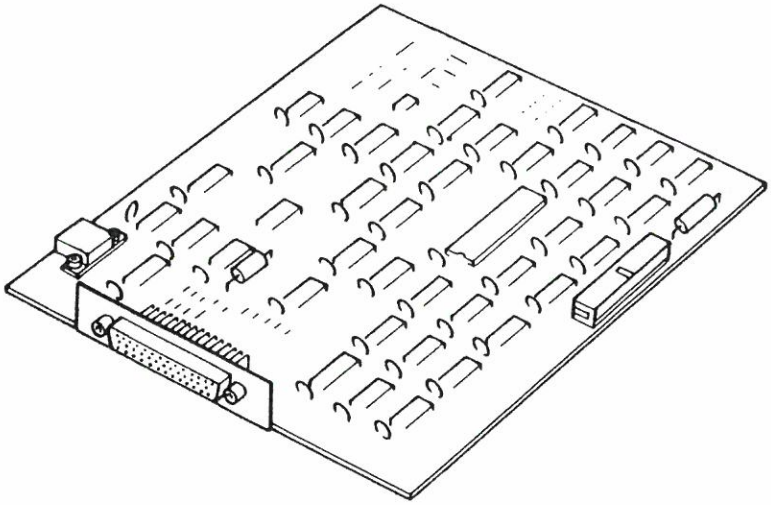


Figure 1.2.5 FDD Controller

1.2.3 Power Supply

The power supply unit receives 115V or 220-240V AC (European version) and supplies DC voltages to the FDD Controller and the floppy disk drives. The output of the power supply cannot be adjusted.

The output voltages are shown in Table 1.2.2.

The integral protective circuit cuts off the outputs when the +5V DC goes above +5.5V.

To reset power after power has been cut off by the protective circuit, turn OFF the power switch and then turn it ON 30 seconds later.

Table 1.2.2 Output Voltages

Output Voltage	Current Capacity	Specified voltage
+ 5V DC	2.0 A	+ 5 ± 0.25V DC
+12V DC	2.0 A	+12 ± 0.6V DC

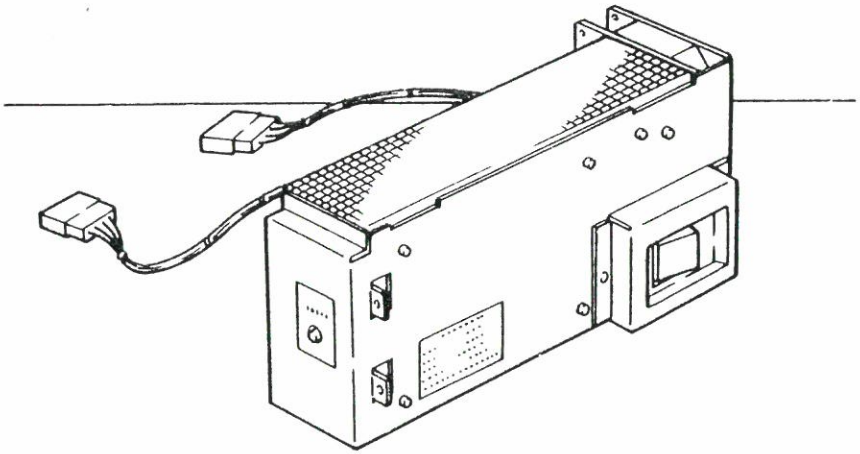


Figure 1.2.6 Power Supply

NOTES

1.3 Specifications

The specifications for each unit of the T100 Personal Computer are described in Tables 1.3.1 and 1.3.2.

Table 1.3.1 Specifications of the T100

DESCRIPTION	FUNCTION
CPU	Z-80A, Clock 3.99 MHz
ROM	32KB ROM BASIC, standard 32KB ROM PACK, optional
RAM	64KB Dynamic RAM, standard
Keyboard	89 keys (alphabet, numeric, controls)
Audio Cassette Interface	1,600 bits/second. For audio cassette tape recorders with remote control
RS232C Interface	600 bits/second, maximum. Will accept acoustic coupler
Printer Interface	Centronics comparable, parallel printer interface
Speaker	Standard
Ext. Expansion Interface	Standard
Liquid Crystal Display	40 char. x 8 lines, 320 x 64 dot matrix
Color CRT Display	High resolution color display, 640x200 dot matrix, 80 char x 25 lines, 8 colors
Green CRT Display	640x200 dot matrix, 80 char x 25 lines

Table 1.3.2 Floppy Disk Drive Unit Specifications

Recording method	Double-sided, double-density
Capacity (formatted)	
Per disk	280 K bytes
Per track	4096 bytes
Per sector	256 bytes
Number of tracks	35 x 2 sides
Number of sectors	16 sectors/track
Data transfer speed	250 K bits/second
Rotational speed	300 rpm
Number of drives	Maximum two drives/unit
Record medium	5 1/4-inch floppy disk
Storage temperature	Approximately -15°C to 47°C
Operating temperature	5°C to 35°C
External dimensions	420mm x 270mm x 130mm
Weight	Approximately 9 kg
Power consumption	Approximately 70W

1.4 System Configuration

Figure 1.4.1 shows the configuration of the T100 system and the connection of optional units.

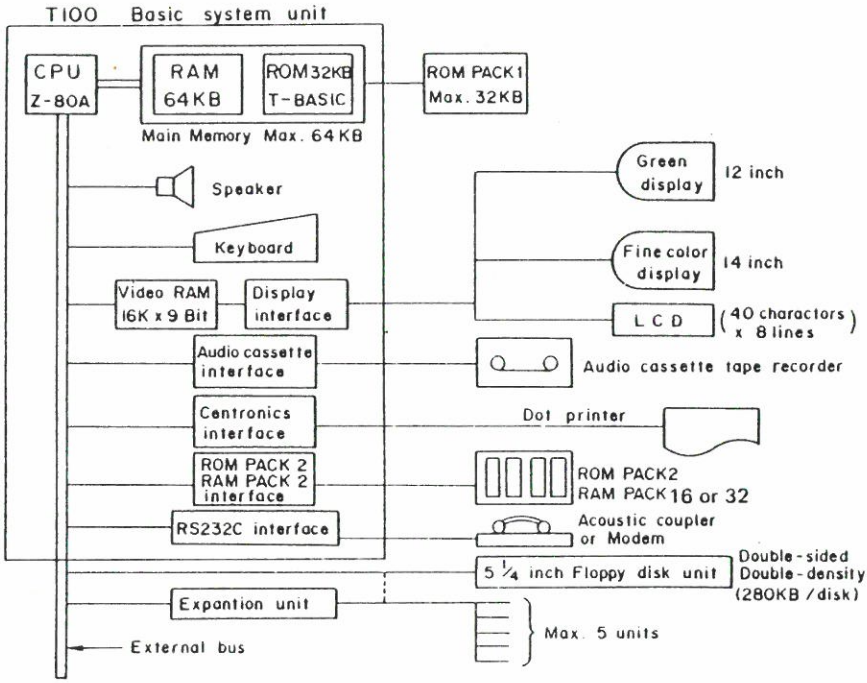


Figure 1.4.1 T100 System Configuration

Model numbers for the T100 Personal Computer and T100 accessory units are shown in Table 1.4.1.

Table 1.4.1 Model Numbers

DESCRIPTION	MODEL NUMBER	FUNCTION
T100 Personal Computer	PA7010U	Z-80A microprocessor, main memory, keyboard and interfaces
ROM PACK	TBA	32KB maximum
RAM PACK 16	PA7242U	16KB
RAM PACK 32	PA7244U	32KB
Green Display	PA7150U	12-inch green phosphor (monochrome) display
Fine Color Display	PA7161U	14-inch high resolution display
LCD/Display	PA7170U	40 character x 8 line dot matrix display
Floppy Disk Drive Unit	PA7200U	Can record approximately 280KB on one floppy disk (DS/DD). Two floppy disk drives per unit
Printer Cable	PA7423U	Cable to connect a Centronics comparable parallel printer
RS232C Cable	PA7426U	Cable to connect an RS232C compatible device

1.5 Maintenance Philosophy

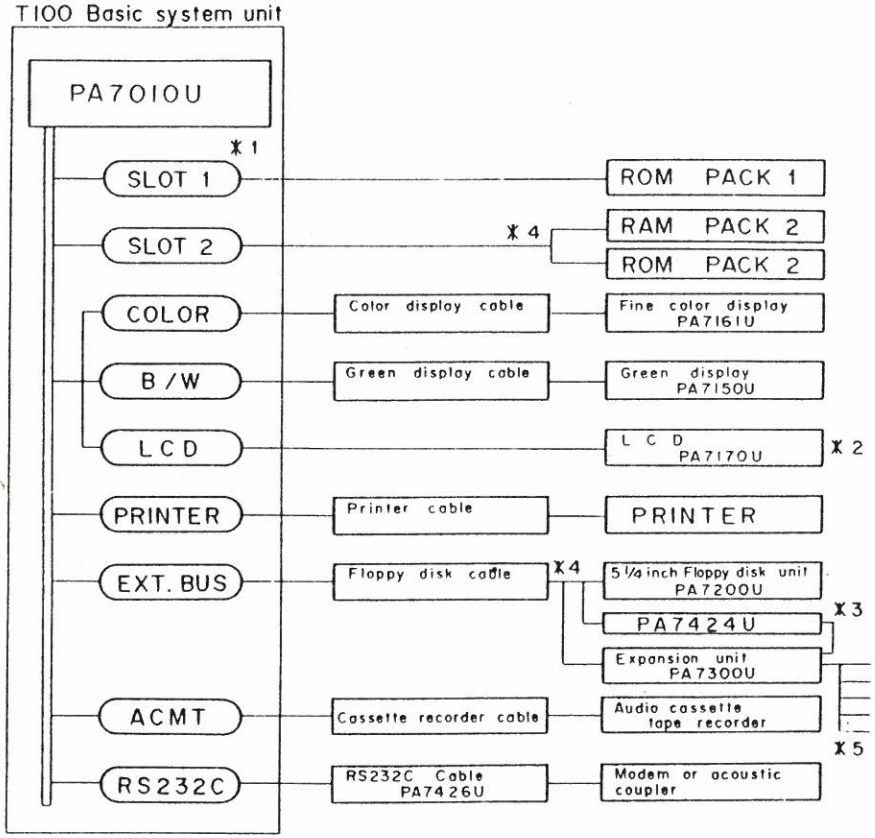
The T100 system needs no scheduled maintenance.

Failures occurring in the T100 system are intended for repair by diagnosis to the failing Field Replaceable Unit (FRU) and the replacement of the FRU. This modular repair philosophy is the philosophy described and supported in this manual.

Failed FRU's will be repaired at a repair depot.

2. SYSTEM CONNECTION

Peripheral devices may be connected to the T100 Personal Computer through the connectors at the back of the CPU/Keyboard by using the cables specified in Figure 2.1.



Note: *1 ( ) means connector.

*2 When LCD is in use, other displays are not available.

*3 Connection thru Expansion unit is available for 5-1/4 inch Floppy disk unit.

*4 To use two units at a time is impossible.

*5 Five units are available to connect at most.

Figure 2.1 System Connection Diagram

2.1 Fine Color Display (CRT)

The Fine Color Display may be connected to the T100 Personal Computer through the -COLOR- connector on the back of the T100 CPU/Keyboard by using the color display cable (PA7422U).

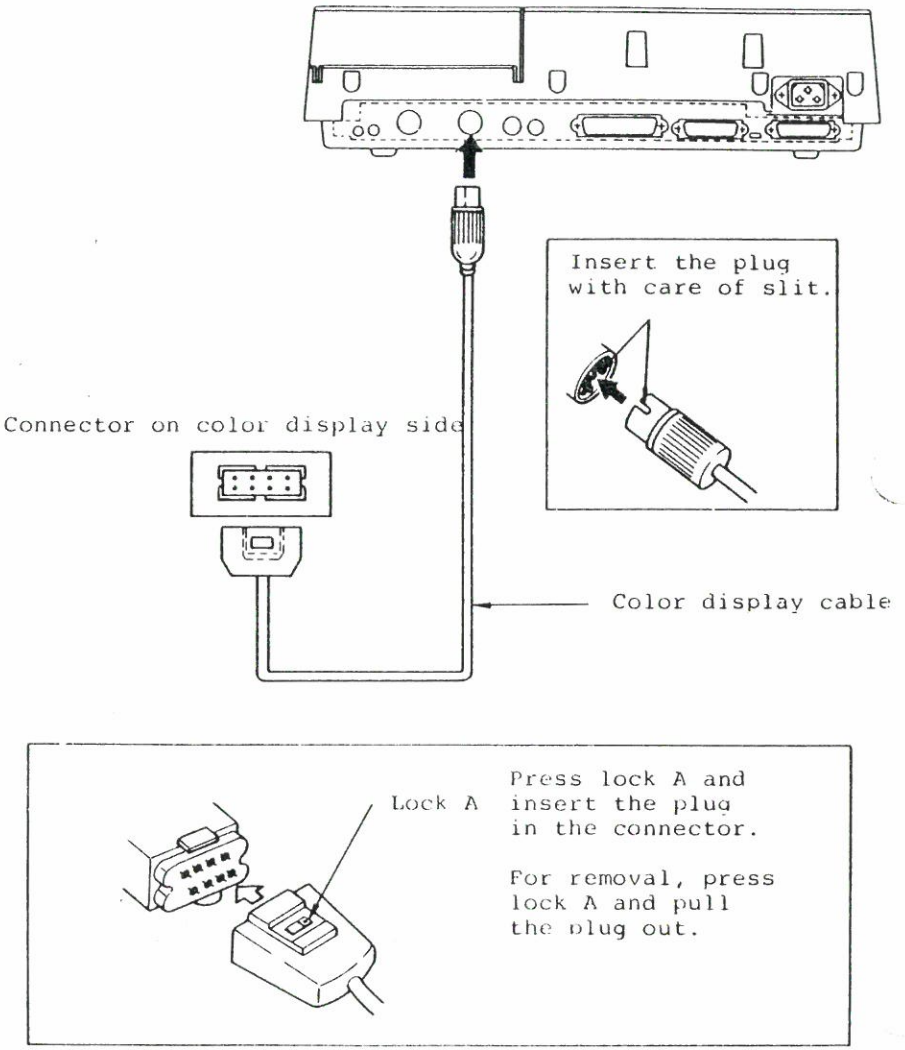

Insert the plug with care of slit.
Connector on color display side
Color display cable
Lock A
Press lock A and insert the plug in the connector.
For removal, press lock A and pull the plug out.

Figure 2.2 Fine Color Display

2.2 Green Display (CRT)

The Green Display may be connected to the T100 Personal Computer through the -GREEN- connector on the back of the T100 CPU/Keyboard by using the green display cable (PA7421U).

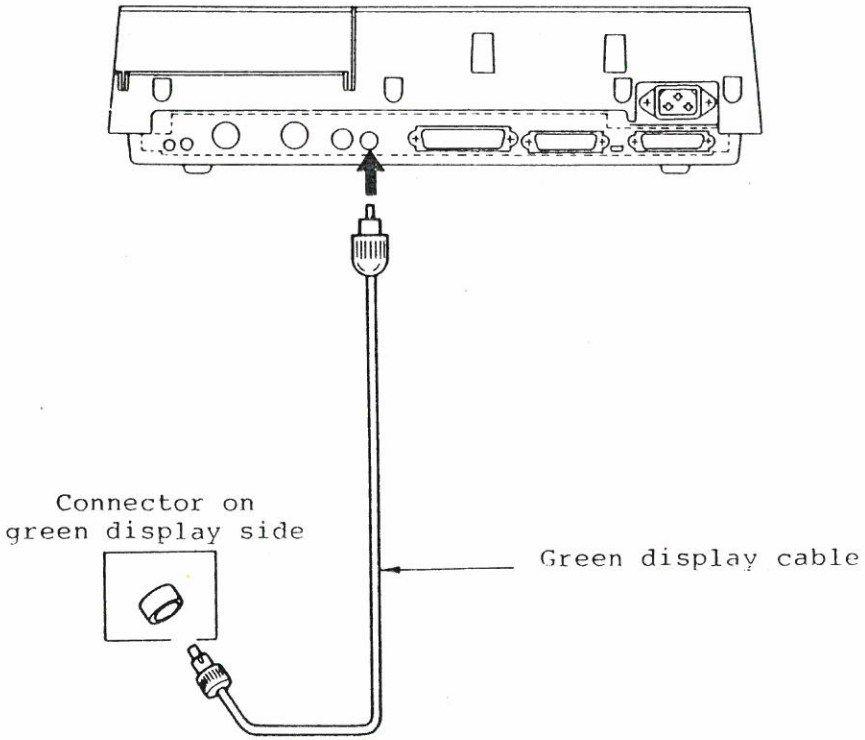


Figure 2.3 Green Display

2.3 Liquid Crystal Display (LCD)

The Liquid Crystal Display may be hung on brackets at the back of the T100 CPU/Keyboard and may be connected to the T100 Personal Computer through the -LIQUID CRYSTAL- connector. If the LCD is connected, other display units connected to the T100 Personal Computer cannot be used.

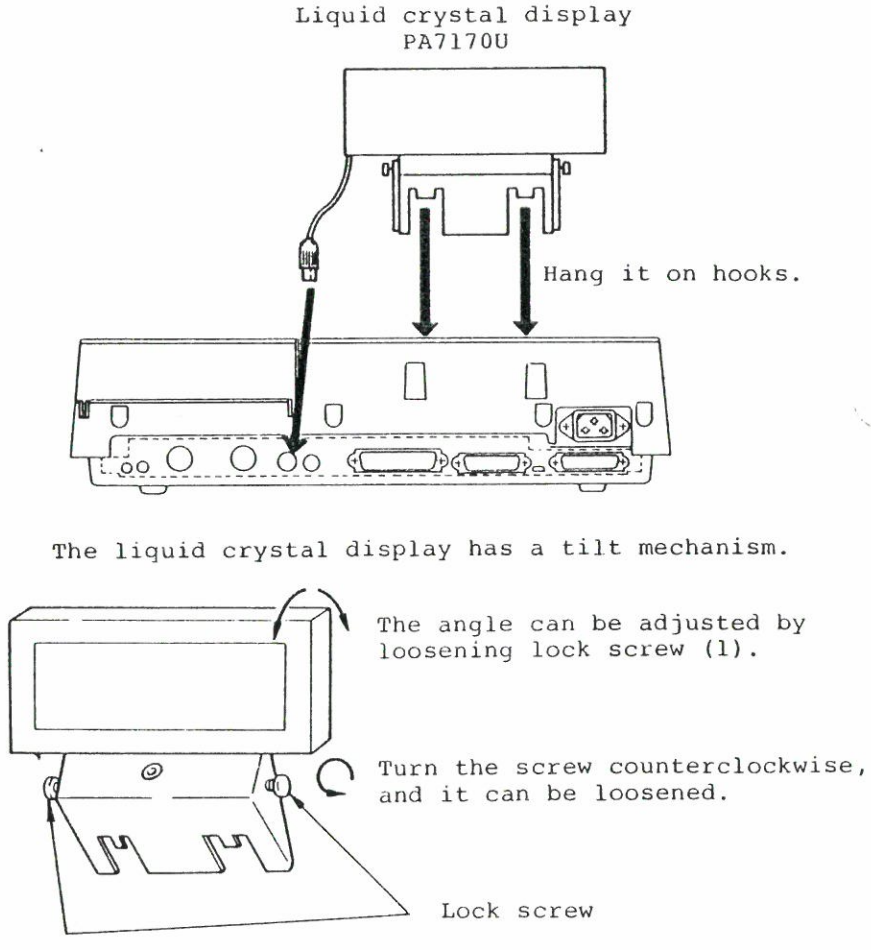

Liquid crystal display
PA7170U
Hang it on hooks.
The liquid crystal display has a tilt mechanism.
The angle can be adjusted by loosening lock screw (1).
Turn the screw counterclockwise, and it can be loosened.
Lock screw

Figure 2.4 Liquid Crystal Display

2.4 Audio Cassette Tape Recorder (ACMT)

An audio cassette tape recorder may be connected to the T100 Personal Computer through the -CASSETTE- connector on the back of the T100 CPU/Keyboard with an audio cassette cable.

CAUTION

The connectors -CASSETTE- and -COLOR- are the SAME shape. DO NOT USE THE WRONG CONNECTOR.

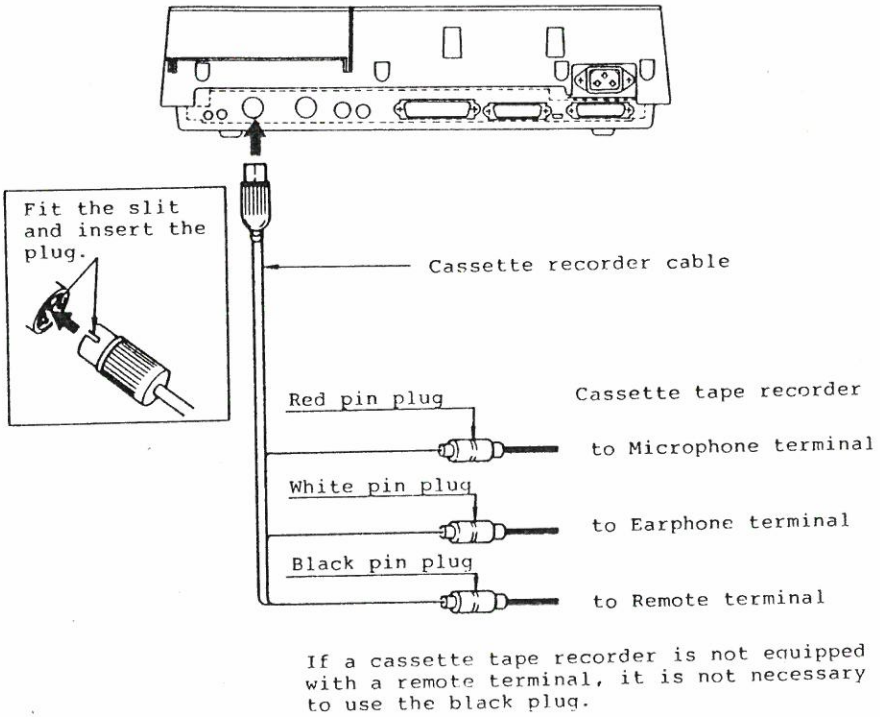

Fit the slit and insert the plug.
Cassette recorder cable
Red pin plug
Cassette tape recorder
to Microphone terminal
White pin plug
to Earphone terminal
Black pin plug
to Remote terminal
If a cassette tape recorder is not equipped with a remote terminal, it is not necessary to use the black plug.

Figure 2.5 Audio Cassette Tape Recorder

2.5 Printer (PRT)

A printer may be connected to the T100 Personal Computer through the -PRINTER- connector on the back of the T100 CPU/Keyboard by using the printer cable (PA7423U).

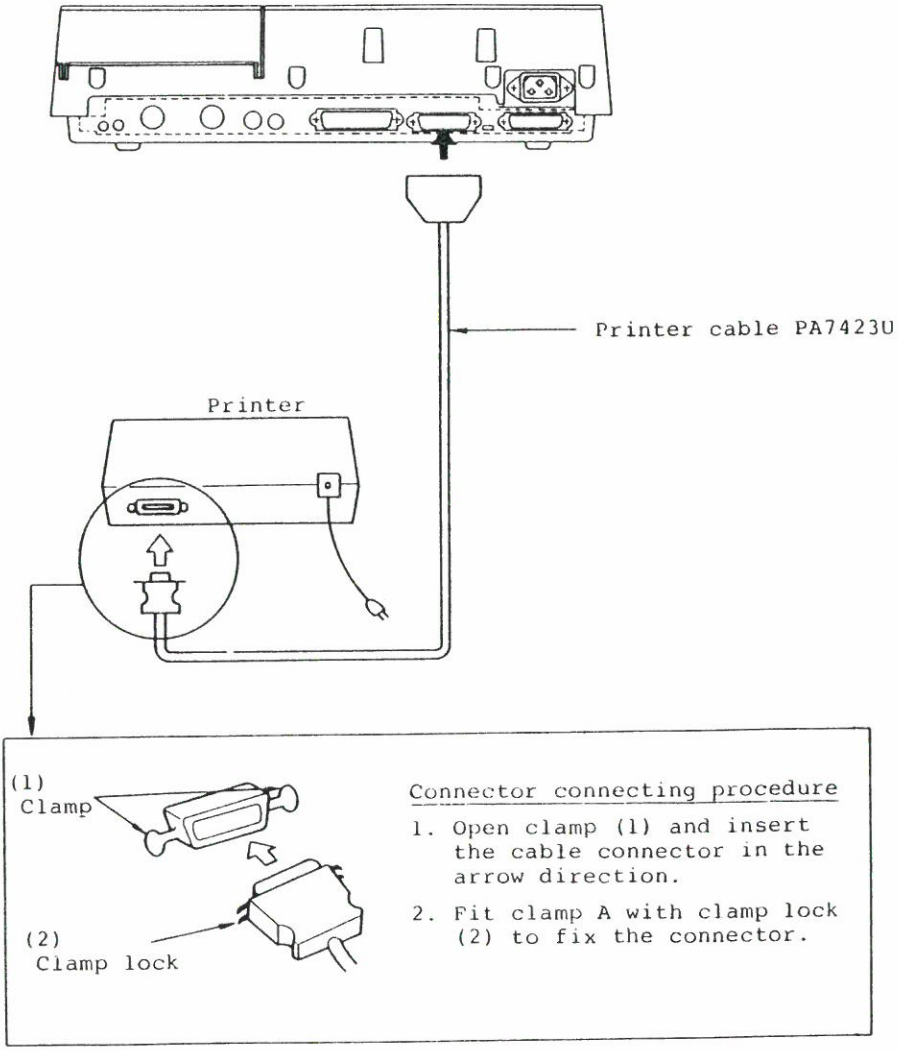

Printer cable PA7423U
Printer
(1)
Clamp
(2)
Clamp lock
Connector connecting procedure
1. Open clamp (1) and insert the cable connector in the arrow direction.
2. Fit clamp A with clamp lock (2) to fix the connector.

Figure 2.6 Printer

2.6 Floppy Disk Drive Unit (FDD)

The FDD may be connected to the T100 Personal Computer through the -EXTERNAL BUS- on the back of the T100 CPU/Keyboard by using the FDD cable (PA7424U).

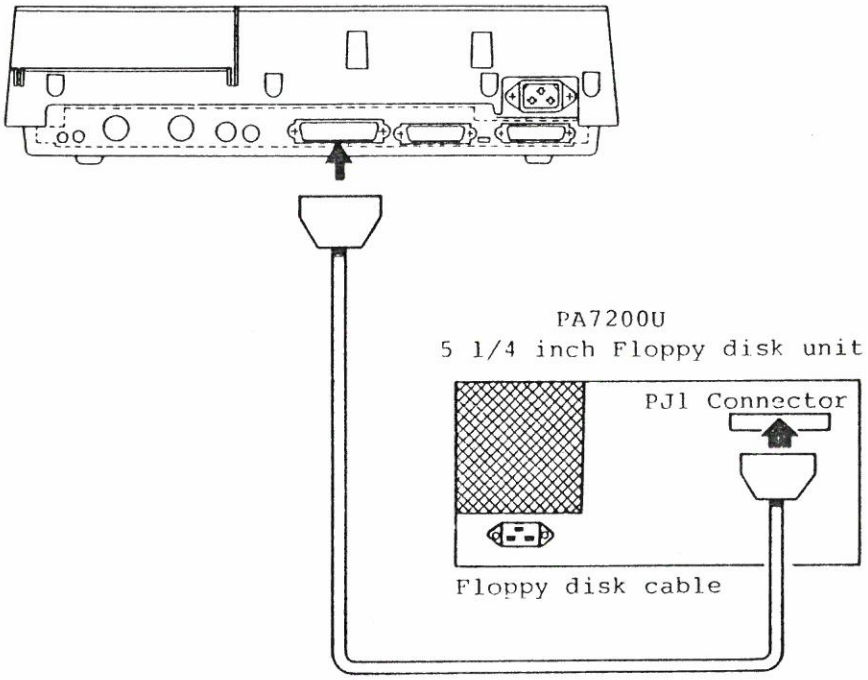


Figure 2.7 Floppy Disk Drive Unit

2.7 RS232C Interface

RS232C compatible devices may be connected to the T100 Personal Computer through the -RS232C- connector on the back of the T100 CPU/Keyboard by using the RS232C cable (PA7426U).

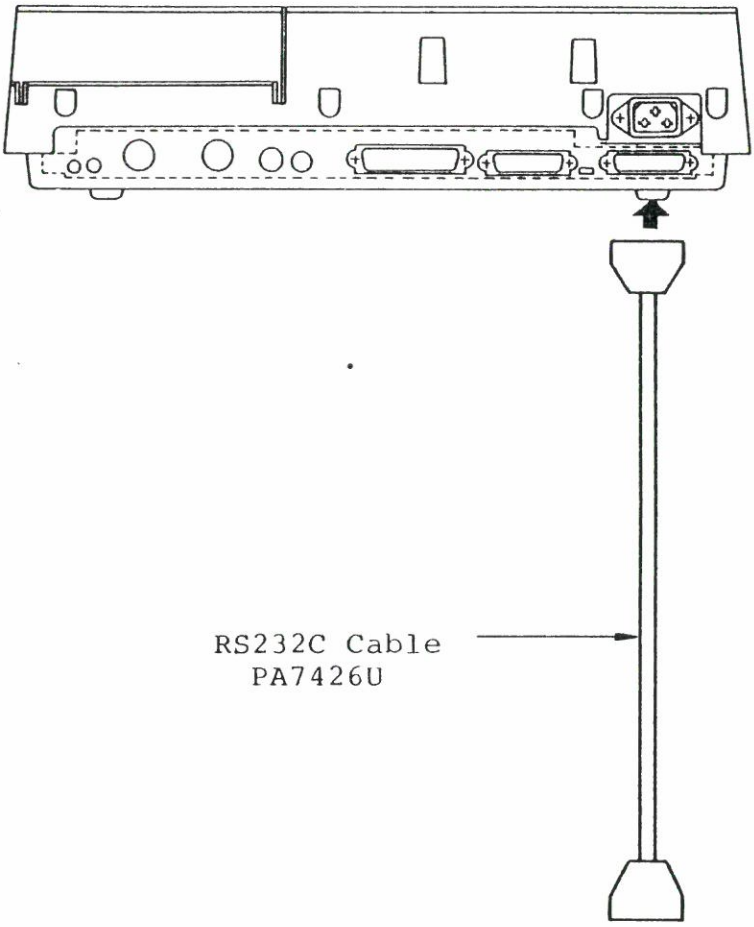


Figure 2.8 RS232C Interface

2.8 ROM PACK and RAM PACK

The T100 Personal Computer may be used with a ROM PACK and/or a RAM PACK by opening the pack cover in the upper right corner of the T100 CPU/Keyboard and inserting the PACK into the appropriate slot.

CAUTION

The PACK slots 1 and 2 are different. **Power to the T100 CPU/Keyboard MUST be turned OFF before inserting a ROM PACK into SLOT 1.** The power should be OFF when inserting ROM and RAM PACKS into Slot 2.

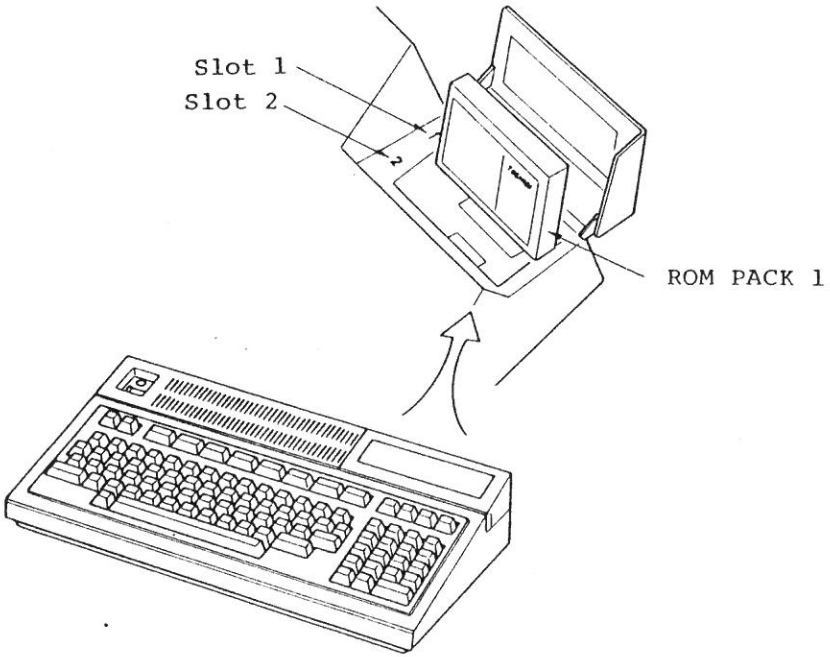


Figure 2.9 ROM PACK and RAM PACK

2.9 Expansion Unit

(To be supplied)

Figure 2.10 Expansion Unit

3. TROUBLE-SHOOTING

This section is designed to help you diagnose and resolve problems in the T100 which are the result of equipment malfunctions. Before you use the trouble-shooting guide there are several things you should know:

- Toshiba products have a well deserved reputation for reliability. The probability that hardware malfunction is responsible for a problem with the system is very small. Usually, the cause of a problem will not be the computer hardware. When a problem occurs, ask yourself what has changed or is new about the use of the computer. Also, remember that hardware failures are seldom subtle. The usual result of a hardware failure is a totally inoperable unit.

- Use all of your senses when you trouble-shoot hardware. Does it smell like anything is burning? (Remember that new units will smell "new.") Are there unusual sounds when the equipment is operating? Does the unit feel hot? (Hot is when you cannot touch the unit without burning your hand.) Most of all, be "machine-wise." When something unexpected happens, check to see if other programs run. The organization of the T100 utilizes most of the system for most functions. If one program will run and another will not, chances are it is the program at fault.

- This trouble-shooting section is intended to isolate the problem of the failing unit only. Trouble diagnosis beyond the unit level should be done only through the module substitution method.

- Finally, be careful. There are some areas of high, dangerous voltage levels in the system units. The benefit of saving a few minutes is never great enough to risk injury to yourself.

3.1 Trouble-Shooting Guide

This guide uses a step-by-step procedure to diagnose T100 equipment malfunctions. It is intended for use with Toshiba supplied equipment, and if used on a T100 attached to non-Toshiba equipment, incorrect diagnosis may result.

To use this guide, begin by disconnecting all units from the T100 CPU/Keyboard.

STEP 1

Action TURN ON the On/Off switch on the T100 CPU/Keyboard.

Check Is the green LED above the On/Off switch lit?

Yes Go to STEP 2.

No CHECK that the T100 CPU/Keyboard is plugged into a "live" outlet by PLUGGING a lamp or other device into the outlet. If the outlet is good then VERIFY that the same power cord is also plugged into the AC IN plug on the back of the T100 CPU/Keyboard. VERIFY that the power cord is good by SUBSTITUTING the cord from another unit such as the T100 FDD or the T100 Printer Unit.

If the power cord requires replacement, see "REPLACEMENT PARTS" for the appropriate part number(s).

Problem If the LED still does not light, the problem is in the T100 CPU/Keyboard. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 2

Action With the On/Off switch in the ON position and the Volume control on the back of the T100 CPU/Keyboard turned fully clockwise, PRESS and HOLD DOWN the "H" key.

Check Do you HEAR the repeat "clicker" sound?

Yes Go to STEP 3.

No VERIFY that the On/Off switch is in the ON position, that the green LED is lit and that the Volume control is turned fully clockwise.

Problem If you still cannot HEAR the "clicker" sound, the problem is in the T100 CPU/Keyboard. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 3

Action With the T100 CRT/Display Unit disconnected from the T100 CPU/Keyboard, PUSH the On/Off switch on the front of the T100 CRT/Display Unit IN to the ON position.

Check Is the green LED on the front of the T100 CRT/Display Unit lit?

Yes Go to STEP 4.

No CHECK that the T100 CRT/Display Unit is plugged into a "live" outlet by PLUGGING a lamp or other device into the outlet.

Problem If the LED still does not light, the problem is in the T100 CRT/Display Unit. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 4

Action With the On/Off switch still in the ON position, MOVE the Brightness control on the front of the T100 CRT/Display Unit to the BRIGHT (rightmost) position.

Check Is a raster displayed?

Yes Go to STEP 5.

No VERIFY that the On/Off switch is in the ON position, that the green LED is lit and that the Brightness control is in the BRIGHT position.

Problem If a raster is still not displayed, the problem is in the T100 CRT/Display Unit. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 5

Action TURN OFF THE POWER ON THE T100 CPU/KEYBOARD AND THE T100 CRT/DISPLAY UNIT BEFORE PROCEEDING.

INSPECT the interface cable for signs of damage. If the cable requires replacement, see "REPLACEMENT PARTS" for the appropriate part number(s).

CONNECT the interface cable between the back of the T100 CRT/Display Unit and the appropriate connector port on the T100 CPU/Keyboard.

PUSH ON the On/Off switch on the T100 CRT/Display Unit. WAIT until the raster described in STEP 4 appears. TURN ON the On/Off switch on the T100 CPU/Keyboard. WAIT at least ten seconds.

Check Has the question, "HOW MANY FILES (0-15)? _" or some other message appeared on the screen?

Yes Go to STEP 6.

No VERIFY that you have correctly followed the instructions given in the **Action** portion of this step.

Problem The problem at this point is undefined. Go to STEP 6 and perform the indicated Action and Check. If the result of STEP 6 is Yes, then the problem is the T100 CRT/Display Unit. If the result of STEP 6 is No, then the problem is the CPU/Keyboard Unit. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 6

Action VERY CAREFULLY, ENTER the following into the T100:

```
1 [RETURN]
SOUND 50,50 [RETURN]
```

Check Was the above sequence followed by a short tone from the T100 CPU/Keyboard?

Yes If the T100 CRT/Display and the T100 CPU/Keyboard seem to be performing correctly at this point, proceed to STEP 7. If the tone check was correct and there is still nothing displayed on the T100 CRT/Display Unit, then the problem is in the T100 CRT/Display Unit. See "MODULAR DIAGNOSIS" for further problem diagnosis.

No

PRESS the RESET button on the back of the T100 CPU/Keyboard. Re-ENTER the sequence above. If the CRT/Display Unit is not working and you can not view your entry, be VERY careful when re-entering the sequence. This will prevent errors and confusion.

If the tone is still not heard then the problem is in the T100 CPU/Keyboard. See "MODULAR DIAGNOSIS" for further problem diagnosis.

Problem

As defined in Yes and No.

STEP 7

Action

ADJUST the Brightness on the T100 CRT/Display Unit to a comfortable level. Also ADJUST the Contrast on the Black/White Unit to the desired level. The failure of either of these adjustments to perform properly means that the T100 CRT/Display Unit needs repair. See "MODULAR DIAGNOSIS" for further problem diagnosis.

VERIFY the function of each key on the T100 CPU/Keyboard. (The COPY key and some of the function keys will not work without the appropriate device connected to the T100.)

If there are any keys which do not perform correctly, then the T100 CPU/Keyboard must be repaired. See "MODULAR DIAGNOSIS" for further problem diagnosis.

If you have a Color CRT/Display Unit, ENTER the following sequence:

ENTER:	LOOK FOR:
COLOR 0,1 [RETURN]	black on blue
COLOR 1,2 [RETURN]	blue on red
COLOR 2,3 [RETURN]	red on purple
COLOR 3,4 [RETURN]	purple on green
COLOR 4,5 [RETURN]	green on light blue
COLOR 5,6 [RETURN]	light blue on yellow
COLOR 6,7 [RETURN]	yellow on white
COLOR 7,0 [RETURN]	white on black

The failure of any of these colors to display correctly means that the T100 CRT/Display must be repaired. See "MODULAR DIAGNOSIS" for further problem diagnosis.

Check If everything to this point has checked out correctly, it is safe to assume that the base system is operating correctly. The CPU tests itself everytime it is powered on and the rest of the functions (exclusive of disk and printer) have been verified. If the problem appears to be FDD or Printer Unit related, proceed to the next step. Otherwise, you should consider either application or software to be the problem with the T100.

STEP 8

Action TURN POWER OFF ON ALL UNITS.
With the T100 FDD disconnected from the T100 CPU/Keyboard, TURN the On/Off switch on the right side of the T100 FDD to the ON position.

Check Is the green LED marked POWER on the front of the T100 FDD lit? VERIFY that the fan at the rear of the unit (above the AC IN plug) is operating by PLACING your hand over the grate and FEELING for airflow out from the T100 FDD.

Yes — Go to STEP 9.

No — CHECK that the T100 FDD is plugged into a "live" outlet by PLUGGING a lamp or other device into the outlet. If the outlet is good then VERIFY that the same power cord is also plugged into the AC IN plug on the back of the T100 FDD.

VERIFY that the power cord is good by SUBSTITUTING the cord from another unit, such as the T100 CPU/Keyboard or the T100 Printer Unit.

If the power cord requires replacement, see "REPLACEMENT PARTS" for the appropriate part number(s).

Problem — If the LED still does not light or if the fan is not running, the problem is in the T100 FDD. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 9

Action — TURN POWER OFF ON THE T100 FDD. INSPECT the interface cable for signs of damage. If the cable requires replacement, see "REPLACEMENT PARTS" for the appropriate part number(s).

CONNECT the interface cable between the back of the T100 FDD and the EXT. BUS port on the back of the T100 CPU/Keyboard. TURN the On/Off switch on the T100 CRT/Display Unit ON. WAIT a short time and then TURN the On/Off switch on the T100 CPU/Keyboard ON.

NOTE: IF FOR ANY REASON THE MESSAGE, "HOW MANY FILES (0-15)? " DOES NOT APPEAR ON THE T100 CRT/DISPLAY UNIT AT THIS TIME, RETURN TO STEP 1.

TURN the On/Off switch on the FDD ON.
PLACE a good SYSTEM DISKETTE in Drive 1 with the label up and the head access groove toward the back of the T100 FDD.

PUSH the RESET button on the back of the T100 CPU/Keyboard.

Check Does the appropriate load message appear on the T100 CRT/Display?

Yes Go to STEP 10.

No PLACE the SYSTEM DISKETTE in Drive 2. PUSH the RESET button as described above.

If the appropriate message still fails to appear, then TRY one or more other SYSTEM DISKETTES and REPEAT the process in both Drive 1 and Drive 2.

Problem If, after several SYSTEM DISKETTES, the appropriate message has still not appeared, then the T100 FDD must be repaired. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 10

Action NOTE: If the original problem was intermittent disk errors, CLEAN the heads using alcohol and swabs before proceeding.

FORMAT a diskette in Drive 1 and then in Drive 2.
COPY a diskette from Drive 1 to Drive 2.
REVERSE the copy and go from Drive 2 to Drive 1.

Check Did the format and copy functions execute correctly?

Yes — The T100 FDD is functioning properly. If intermittent disk errors persist and cleaning with alcohol and swabs does not help, it will be necessary to have the T100 FDD repaired. See "MODULAR DIAGNOSIS" for further problem diagnosis.

If the problem is with the T100 Printer Unit, proceed to the next step.

No — VERIFY that you are operating the format and copy programs properly.

Problem — If the format and copy programs still do not execute, then the T100 FDD must be repaired. See "MODULAR DIAGNOSIS" for further problem diagnosis.

STEP 11

Action — Many types of printers can be connected to the T100 Personal Computer.

REFER to the appropriate printer manual for instructions on trouble-shooting the printer.

Inspection of the printer interface cable and the execution of program print routines will normally eliminate the T100 as the cause of printer related failures.

The T100 Personal Computer should be fully operable if you have reached this point without problem.

CAUTION

The following subsections are intended to assist the service technician in diagnosing problems within the T100 Personal Computer functional units. The process is essentially one of modular substitution. Do not attempt repair of the T100 beyond the modular level with the resources provided in this manual. COMPONENT DIAGNOSIS AND REPLACEMENT ARE NOT SUPPORTED BY THIS MANUAL AND ATTEMPTS TO ACCOMPLISH REPAIR THROUGH THESE METHODS ARE ALMOST CERTAIN TO RESULT IN LOST TIME AND EXTRA MODULE REPAIR CHARGES.

The unit Trouble-Shooting Guide in section 3.1 is virtually the same guide as the one provided in the T100 Owner's Manual. This is intentional in order to allow the service technician to "pick up" where the customer has left off and to repeat the process that led the customer to believe that the submitted unit is the failing unit. Quite often, this process alone will replicate the failure experienced by the customer.

The subsections that follow are organized as one subsection per unit. Some units (i.e., the displays) are intended to be replaced as a unit. Others are intended for modular repair. The following lists the units and subsections:

Unit	Subsection
T100 CPU/Keyboard	3.2.1
T100 Floppy Disk Drive Unit	3.2.2
T100 CRT/Display	3.2.3
T100 LCD/Display	3.2.4

3.2.1 CPU/Keyboard

Field Replaceable Units:

Power Supply Assembly
Keyboard Assembly
Speaker
CPU Printed Circuit (PC) Board

FRU Isolation:

Power Supply Assembly -
The power supply must provide the required voltages to the CPU PC Board and Keyboard Assembly. Isolation consists of measuring the output voltages. Since none of the voltages are adjustable, failure of any of the voltages requires replacement of the power supply. (Refer to sections 5 and 6 for the replacement procedure and the voltage checks.)

Keyboard Assembly -
The Keyboard Assembly must detect the depression of a key and provide the CPU PC Board with the proper key code. Isolation consists of executing the Keyboard Test Programs to determine if all keys are functioning properly. The failure of any key requires the replacement of the Keyboard Assembly. (Refer to sections 4 and 5 for the test program instructions and the replacement procedure.)

Speaker -
The speaker translates the electrical signal provided by the CPU PC Board into mechanical vibrations which can be heard by the ear. Isolation consists of a physical inspection of the connections and the speaker cone and a simple resistance measurement of the speaker coil. A good coil should measure approximately 8 ohms. Any measurement of more than 0 ohms and less than 50 ohms means the speaker should produce at least some sound.

The measurement should be made at the connector to the CPU PC Board, and a measurement outside of the range indicated or a failure to produce a correct sound requires replacement of the speaker. (Refer to section 5 for the replacement procedure.)

CPU PC Board -
The CPU PC Board is the heart of the T100. The single best method for isolation is substitution. Replacement of the CPU PC Board will determine whether the board is good or bad more quickly than any other method. (Refer to section 5 for the replacement procedure.)

3.2.2 Floppy Disk Drive Unit

Field Replaceable Units:

Power Supply Assembly
FDD Controller
Drive 1 and Drive 2

FRU Isolation:

Power Supply Assembly -
The power supply must provide the required voltages to the FDD Controller and floppy disk drives. Isolation consists of measuring the output voltages. Since none of the voltages are adjustable, failure of any of the voltages requires replacement of the power supply. (Refer to sections 5 and 6 for the replacement procedure and the voltage checks.)

FDD Controller -
The FDD Controller is the heart of the T100 Floppy Disk Drive Unit. The single best method for isolation is substitution. Replacement of the FDD Controller will determine whether the board is good or bad more quickly than any other method. (Refer to section 5 for the replacement procedure.)

Drive 1 and Drive 2-
The two floppy disk drives write and read data from and to the T100 CPU/Keyboard through the FDD Controller. Since the drives are exactly the same other than the position of the jumper plugs and terminator, the best method of isolation is to move the plugs and terminator and thereby swap the drives. The only part which is field replaceable in the drive is the drive belt. (Refer to sections 5 and 6 for replacement instructions and head cleaning instructions.)

3.2.3 CRT/Display

Field Replaceable Units:

Green CRT/Display
Fine Color CRT/Display

FRU isolation:

CRT/Display -
Both the green and color displays contain no field replaceable parts. Failure of either display to function correctly requires replacement of the entire display as a unit.

3.2.4 Liquid Crystal Display (LCD)

Field Replaceable Units:

Liquid Crystal Display (LCD)

FRU Isolation:

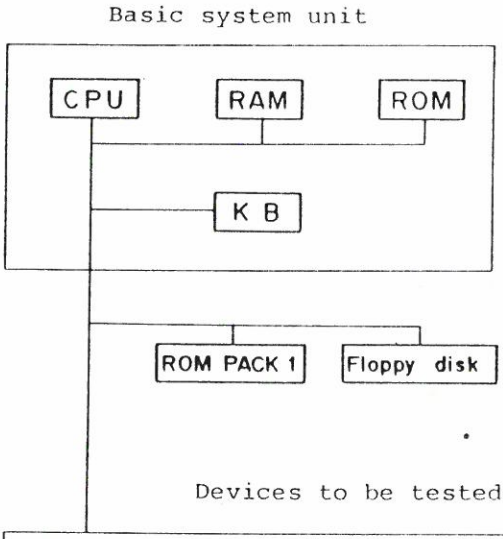
Liquid Crystal Display (LCD) -
The LCD contains no field replaceable parts. Failure of the display to function correctly requires replacement of the entire display as a unit.

4. TEST PROGRAMS

4.1 General Description

Test programs are used to verify the functions and operations of the T100 CPU/Keyboard and peripheral devices.

The T100 CPU/Keyboard, devices to be tested, the Diagnostic ROM PACK or an FDD with the Diagnostic Test Disk are necessary to execute the test program.



CPU: Central Processor Unit
RAM: Random Access Memory
ROM: Read Only Memory
KB: Keyboard

FDD	:	Floppy disk unit
CRT(LCD)/KB	:	Display (Liquid crystal)/Keyboard
ACMT	:	Audio cassette magnetic tape
PRT	:	Printer
*RS232C	:	Communication controller
*SOUND	:	Speaker
*TIMER	:	Timer
RAM/ROM PACK 2	:	RAM PACK 16 or 32/ROM PACK 2
*RAM	:	Random access memory
*ROM	:	Read only memory

(Note) Devices marked with * are built in T100 Basic system unit.

Figure 4.1 System Configuration for Test Program

Structure of Test Programs:

The test programs are organized as shown below:

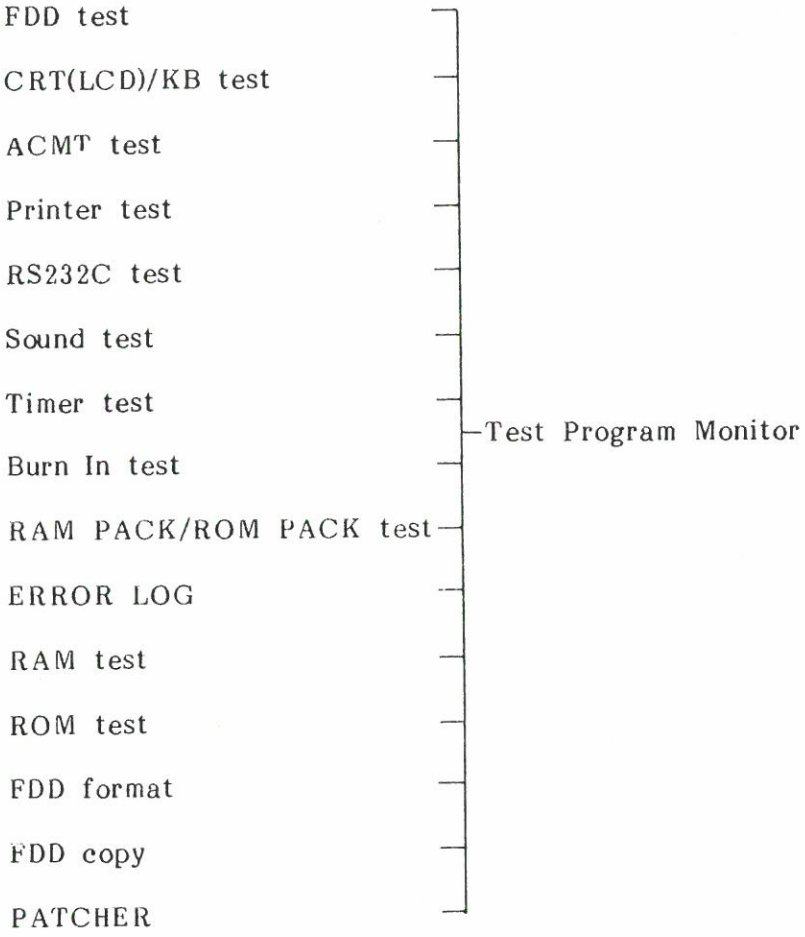


Figure 4.2 Organization of Test Programs

4.2 Test Program Load

Load the test program from a ROM PACK or floppy disk to main memory for program selection and execution.

4.2.1 Test Program Load from ROM PACK

Turn OFF the power switch of the T100 CPU/Keyboard and insert the Diagnostic ROM PACK into slot 1. Turn ON the power switch and perform program load as described in the following procedure:

CAUTION

Make sure that the power switch on the T100 CPU/Keyboard is **OFF** prior to insertion of the Diagnostic ROM PACK in slot 1.

Load from ROM PACK

A- TURN OFF the power switch on the T100 CPU/Keyboard.
B- INSERT the Diagnostic ROM PACK.
C- TURN ON the power switch.
D- EXECUTE LOAD.
E- REFER to the displayed TEST MENU.

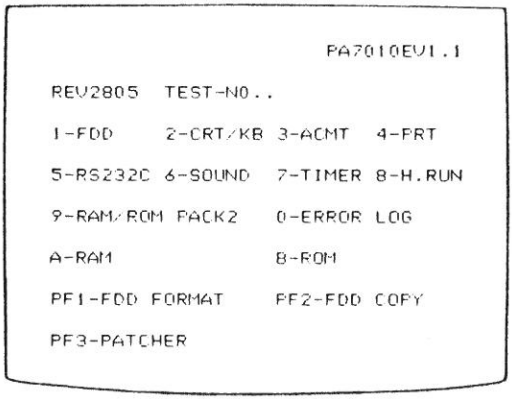


Figure 4.3 TEST MENU

LOAD Complete
Program load is complete when the TEST MENU is displayed.

LOAD Incomplete

If the TEST MENU is not displayed, the following should be checked:

1. Diagnostic ROM PACK - Remove, insert and retry; try another Diagnostic ROM PACK.
2. Refer to the Trouble-Shooting Guide - Section 3.

4.2.2 Test Program Load from FDD

Load from FDD

A- TURN OFF the power switch on the T100 CPU/Keyboard.
B- TURN ON the power switch on the FDD.
C- INSERT the Diagnostic Disk.
D- TURN ON the power switch on the T100 CPU/Keyboard.
E- The Diagnostic LOAD will be executed automatically.
F- REFER to the displayed TEST MENU.

LOAD Complete

Program load is complete when the TEST MENU is displayed.

LOAD Incomplete

If the TEST MENU is not displayed, the following should be checked:

1. Diagnostic Disk - Remove, insert and retry; try another Diagnostic Disk.
2. Refer to the Trouble-Shooting Guide - Section 3.

4.2.3 Halt/Restart

To HALT a test during input, during test or at an error, do the following to return to the SUBTEST MENU:

OPERATION

SUBTEST MENU

During INPUT	PRESS [DEL] key; system returns to SUBTEST MENU.
During TEST	PRESS [CTRL] and [BREAK] keys; system returns to SUBTEST MENU.
During RETEST	PRESS [ESC] key; Test halts. PRESSing the [ESC] key again will restart the test.
During HALT	PRESS [DEL] key; system returns to SUBTEST MENU.
After an ERROR	PRESS [DEL] key; system returns to SUBTEST MENU.

4.2.4 Changing the Test Device

To change the test device, return the program to the TEST MENU.

OPERATION

During test

Return to SUBTEST MENU	PRESS the [CTRL] and [BREAK] keys; test stops.
Return to TEST MENU	PRESS the [-] key.
Change test	Select new test.

4.2.5 Copy CRT to Printer

The CRT display can be printed on the Printer.

PRESS the [ESC] key to halt the test. PRESS the [COPY] key to print.

OPERATION

After an ERROR or after the [ESC] key is PRESSed.

CRT screen in static state (with ERROR).

PRESS the [COPY] key.

CRT display prints on the Printer.

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

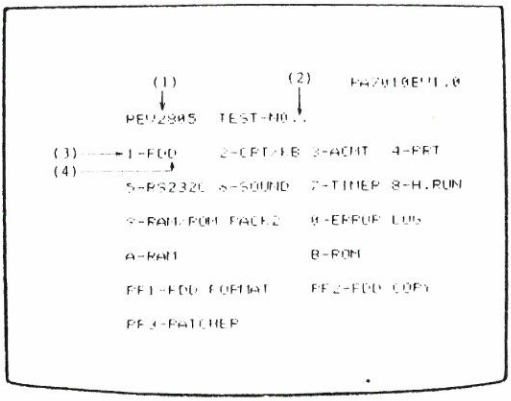


Figure 4.4 TEST MENU

Explanation of Figure 4.4:

(1) [REV] Test revision and date of program production.

REV 2 8 05

Date	Example:	5th
Month	Example:	August
	October:	X
	November:	Y
	December:	Z
Year	Example:	1982

This 2 is displayed.

(2) [TEST-NO..] Input field for test number. Refer to the test names (example: FDD) and to their associated test numbers (example: FDD = 1).

(3) [1] Test number.
(4) [FDD] Test name.

B. INSERT a scratch disk in the drive to be tested and close the drive door.
C. ENTER [1] to select the FDD test.
D. PRESS the [RETURN] key. The SUBTEST MENU will display.

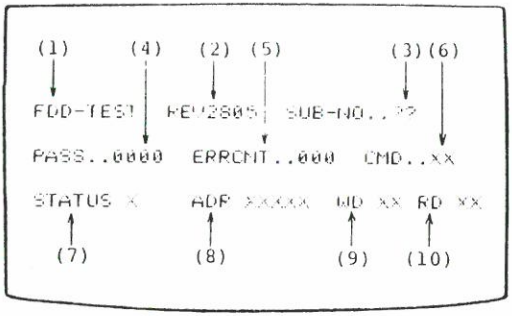


Figure 4.5 SUBTEST MENU

Explanation of Figure 4.5:

(1) [FDD] Test device name.
(2) [REV] Test revision. (Refer to reference (1) of the TEST MENU.)
(3) [SUB-NO..] Input field for the two digit subtest number.
(4) [PASS..XXXX] Indicates the current test pass count.
(5) [ERRCNT] Indicates the number of errors which have occurred.
(6) [CMD] Command. See the command code chart in Appendix A.
(7) [STATUS] Indicates the status returned by the device being tested.
(8) [ADR] Indicates the track, sector and head address during the test.

ADR XX X XX

Sector address (1 to 16)
Head address (0/1)
Track address (0 to 34)

(9) [WD] Write data.
(10) [RD] Read data.

E. ENTER the test number of the desired test from the subtest table below. Entry must be in the format indicated.

Table 4.1 FDD Subtest

Subtest	Test Description
*1	SEEK and READ test
*2	Sequenced WRITE/READ test
*3	Random WRITE/READ test
*4	Selected WRITE test
*5	Selected READ test
*6	Worst case WRITE/READ test
*7	READ only test
*8	Worst case random test

* Indicates the drive number as:
1 = Floppy disk drive #1
2 = Floppy disk drive #2
5 = Floppy disk drives #1 and #2

* 1

Subtest number
Drive number or 5

F. PRESS the [RETURN] key. The Test Loop Inquiry will be displayed.

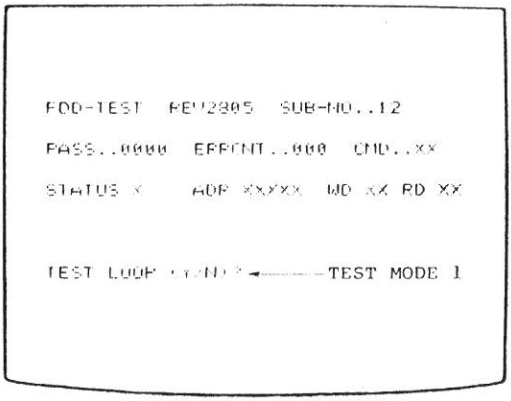


Figure 4.6 Test Loop Inquiry

G. **TEST LOOP (Y/N)?_** ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

The Error Stop Inquiry will be displayed.

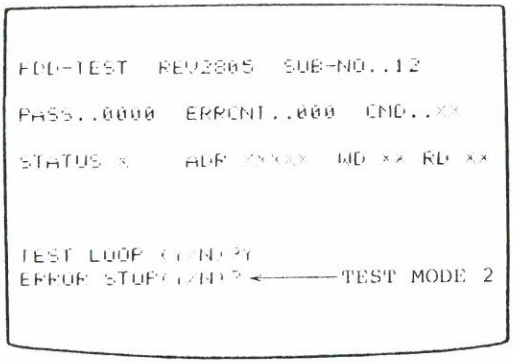


Figure 4.7 Error Stop Inquiry

H. **ERROR STOP (Y/N)?_** ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3.)
N = Test execution will continue regardless of errors. (See Note 2.)

Test Execution will begin as soon as [Y] or [N] is entered. See Note 4 for the execution of subtests and screen displays.

NOTE 1: Test action when an error occurs after [Y] is entered for ERROR STOP (Y/N)?_.

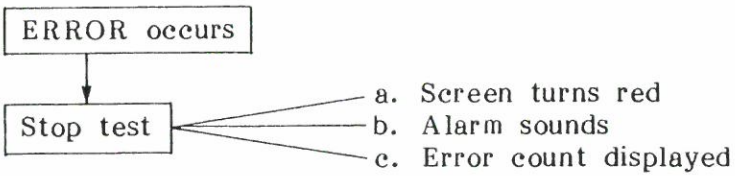


Figure 4.8 Error Mode 1

Three (3) operations are available at this point:

ENTER [C] The test will restart at the next step.
ENTER [R] The error sequence will be retried.
ENTER [DEL] The test will return to the SUBTEST MENU.

NOTE 2: Test action when an error occurs after [N] is entered for ERROR STOP (Y/N)?_.

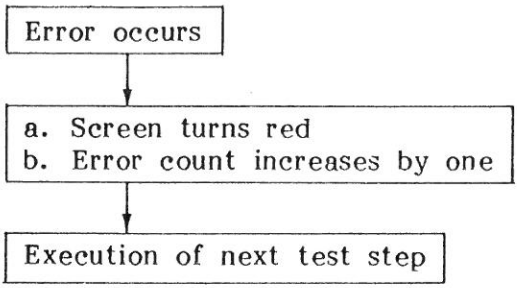


Figure 4.9 Error Occurrence 2

NOTE 3: Procedure for changing the retry default count.

Retry after an error is automatically executed ten times. This default count may be modified to any number from 0 to 255.

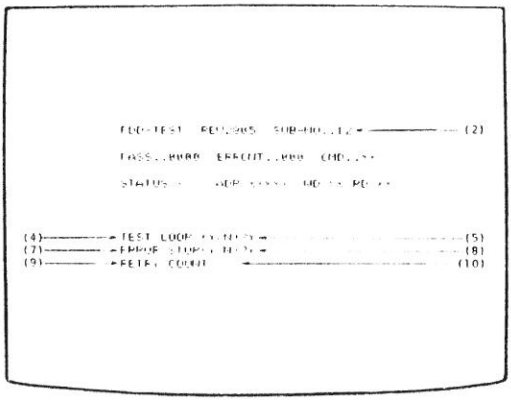


Figure 4.10 Retry Assignment

1- In the FDD SUBTEST MENU.
2- ENTER subtest number.

3- PRESS the [RETURN] key.
4- TEST LOOP (Y/N)?_ is displayed.
5- ENTER [Y] or [N].
6- ERROR STOP (Y/N)?_ is displayed.
7- ENTER [CTRL]/[Y] or [CTRL]/[N].
8- RETRY COUNT is displayed.
9- ENTER the number of retries. (Maximum = 255)
10- PRESS the [RETURN] key.
11- FDD test is executed.

NOTE 4: Execution of subtests and screen displays.

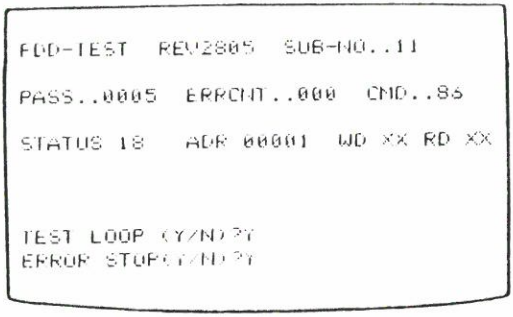


Figure 4.11 FDD Subtest *1

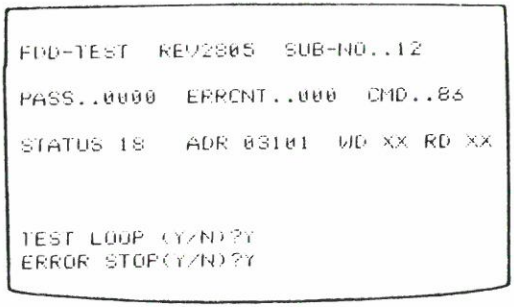


Figure 4.12 FDD Subtest *2

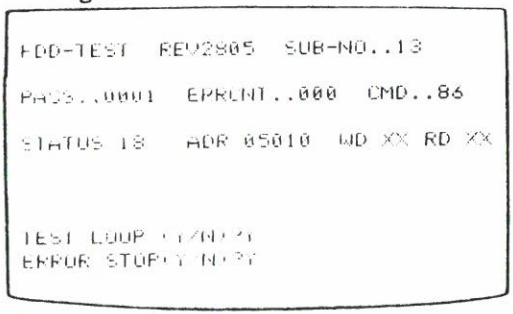


Figure 4.13 FDD Subtest *3

OPERATION of FDD Subtest *4

1- In the FDD SUBTEST MENU.
2- ENTER [*4] where * is the drive number.
3- PRESS the [RETURN] key.
4- TEST LOOP (Y/N)? _ and ERROR STOP (Y/N)? _ are displayed. ENTER [Y] or [N] as appropriate.
5- ENTER write data in the form [XX] where X is a hexadecimal character (0 to F).
6- ENTER the track number in the form [XX] where XX is a number from 01 to 34.
7- ENTER the head number in the form [X] where X is either 0 or 1.
8- Subtest *4 will execute.

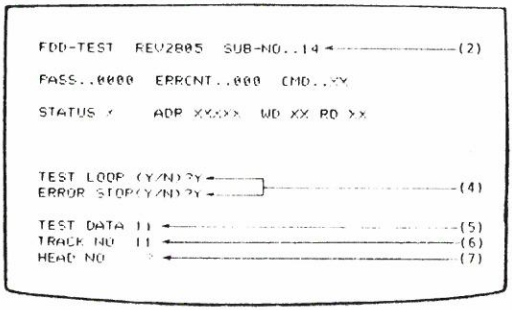


Figure 4.14 FDD SUBTEST MENU *4

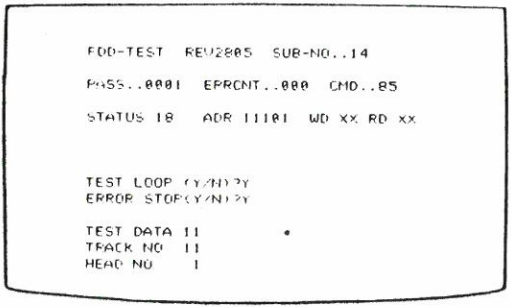


Figure 4.15 Subtest *4

OPERATION of FDD Subtest *5

1- In the FDD SUBTEST MENU.
2- ENTER [*5] where * is the drive number.
3- PRESS the [RETURN] key.
4- TEST LOOP (Y/N)? _ and ERROR STOP (Y/N)? _ are displayed. ENTER [Y] or [N] as appropriate.

5- ENTER the track number in the form [XX] where XX is a number from 01 to 34.
6- ENTER the head number in the form [X] where X is either 0 or 1.
7- Subtest *5 will execute.

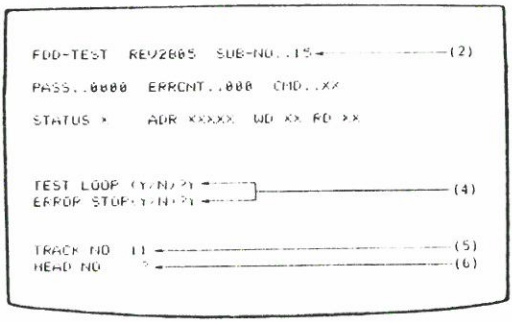


Figure 4.16 FDD SUBTEST MENU *5

NOTE: Subtests *4 and *5 execute on the specified track and head only. To specify a different track and/or head, return to the SUBTEST MENU.

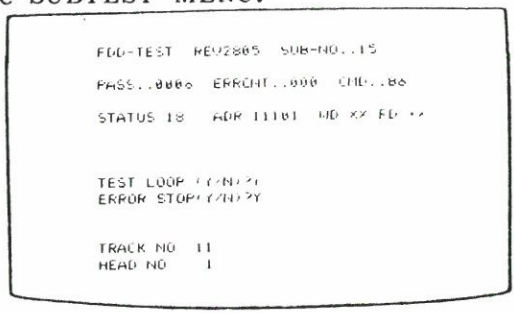


Figure 4.17 FDD Subtest *5

OPERATION of FDD Subtests *6, *7 and *8

1- In the FDD SUBTEST MENU.
2- ENTER [*X] where * is the drive number and X is test number 6, 7 or 8.
3- PRESS the [RETURN] key.
4 TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.
5- ENTER the number of test passes desired as [XXXX] where XXXX is any number from 1 to 9999.
6- PRESS the [RETURN] key.
7- Subtest *6, *7 or *8 will execute.

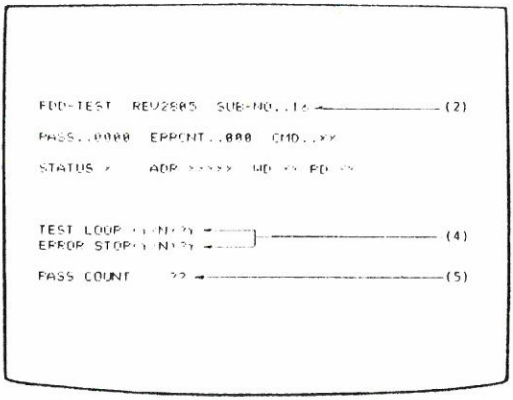


Figure 4.18 FDD SUBTEST MENU *6, *7, *8

NOTE: If the [N] key is entered for TEST LOOP (Y/N)?, the PASS COUNT option will not be displayed.

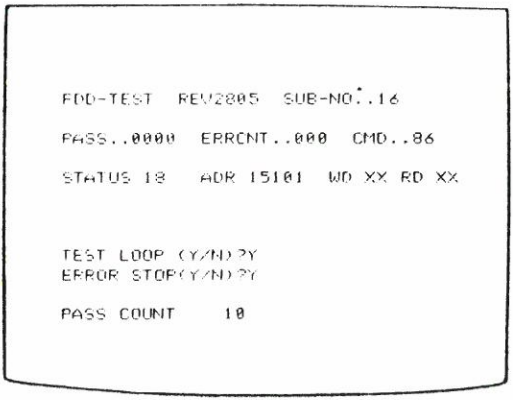


Figure 4.19 FDD Subtest *6

4.4 CRT(LCD)/Keyboard Test

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

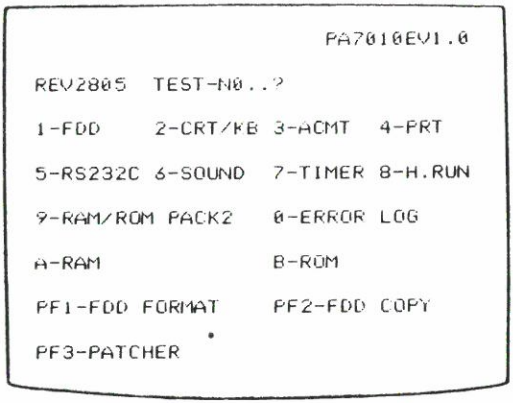


Figure 4.20 TEST MENU

B. ENTER [2] to select the CRT/KB test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

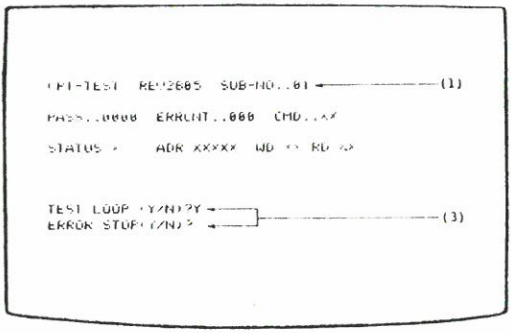


Figure 4.21 SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.2 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

Table 4.2 CRT Subtests

Subtest	Test description
01	Continuous character display test/LCD test
02	Character display and cursor movement test
03	Graphic pattern test
04	Fine graphic pattern test
05	Keyboard test 1
06	80-character display test
07	Keyboard test 2
08	12-key test
09	H-pattern test
10	Cross hatch test

NOTE: Subtest 01 includes two tests: the CRT test and the LCD test. When an LCD is connected to the T100 CPU/Keyboard, the LCD test is automatically selected.

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution. Sample screen displays and test sequences are shown below.

Figure 4.22 CRT Subtest 01 on the CRT

1: DISPLAY characters from left to right, top to bottom of the screen.

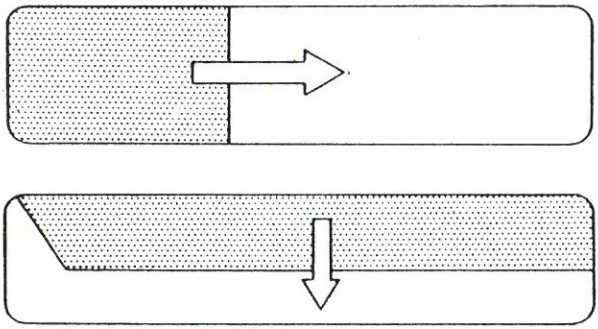


Figure 4.23 CRT Subtest 01 on the LCD

1: DISPLAY characters from left to right, top to bottom of the screen.
2: INVERT black and white.
3: SCAN the screen.
4: DISPLAY example 1.
5: DISPLAY example 2.

Table 4.2.1 LCD Subtest

Subtest	Test description
01	Continuous character display
02	H-pattern test (8 lines)
03	H-pattern test (6 lines)
04	Graphic pattern test 1
05	Graphic pattern test 2
06	Keyboard test 1
07	Keyboard test 2
08	12-key test
09	Graphic pattern test 3

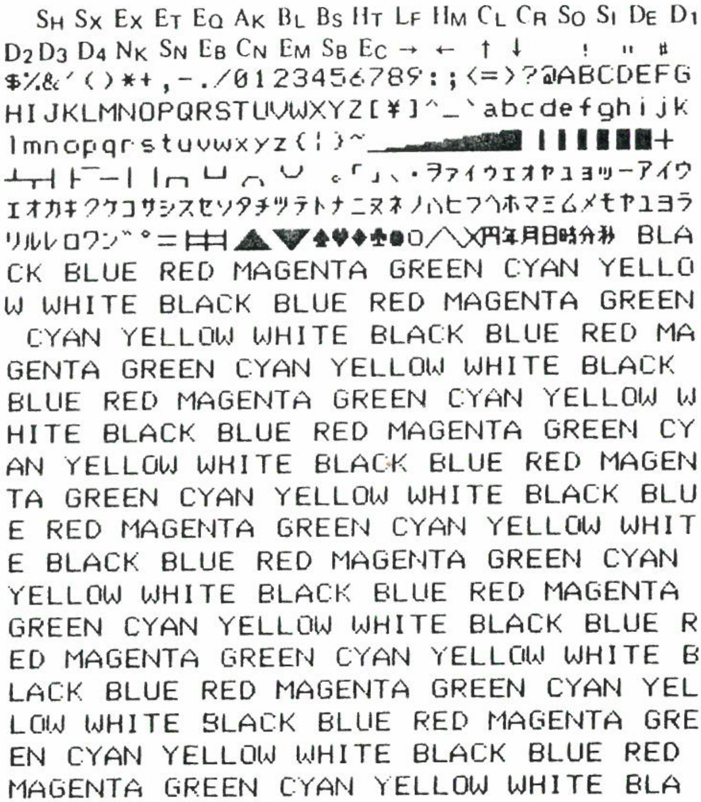


Figure 4.24 CRT Subtests 02 and 06

1: SCAN the screen.
2: CHANGE the background color. DELETE a color name.
3: REPEAT 1 and 2.

NOTE: Subtest 02 displays 36 x 24 characters and subtest 06 displays 80 x 25 characters.

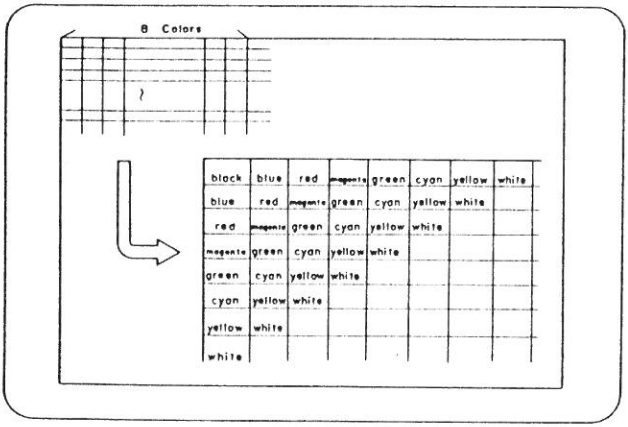

8 Colors
black blue red magenta green cyan yellow white
blue red magenta green cyan yellow white
red magenta green cyan yellow white
magenta green cyan yellow white
green cyan yellow white
cyan yellow white
yellow white
white

Figure 4.25 CRT Subtest 03

1: DISPLAY color blocks.
2: CHANGE the background color from black through white in sequence.
3: REPEAT 1.

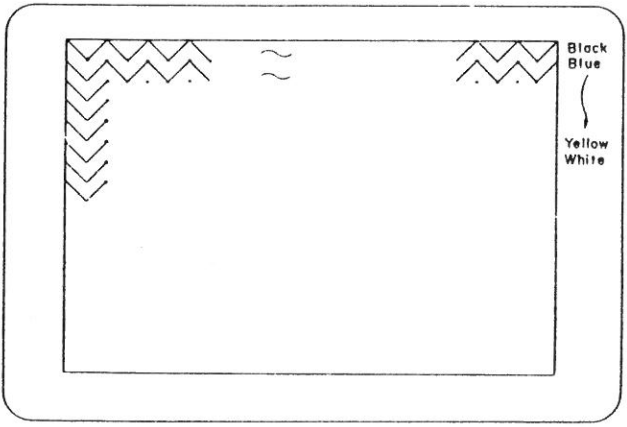


Figure 4.26 CRT Subtest 04

1: DISPLAY pattern on screen.
2: CHANGE the background color from black through white in sequence.
3: REPEAT 1.

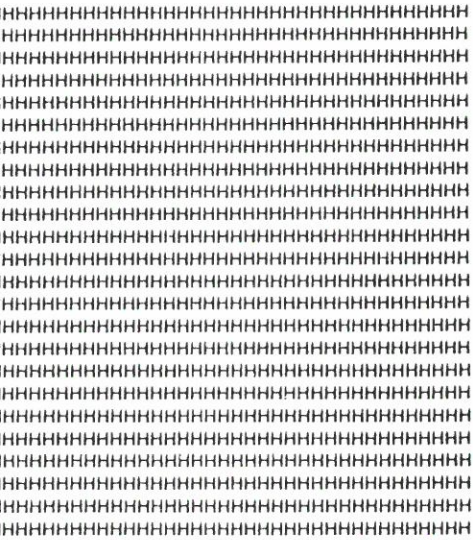


Figure 4.27 CRT Subtest 09

1: DISPLAY H pattern on screen.
2: CHANGE the background color from black through white in sequence.
3: REPEAT 1.

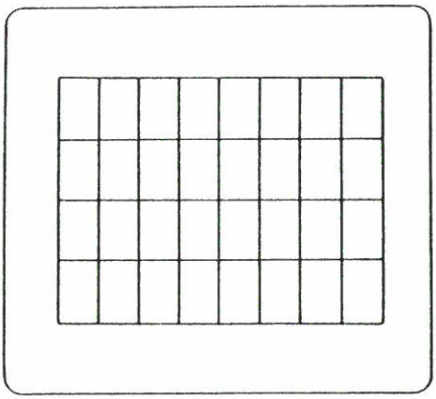


Figure 4.28 CRT Subtest 10

1: DISPLAY cross hatch pattern on screen.
2: CHANGE the background color from black through white in sequence.
3: REPEAT 1.

Figure 4.29 Display Character Set

* Those characters shown in the area indicated are color attribute characters and are displayed as a space [_].

OPERATION of Subtests 05, 07, and 08

1- In the SUBTEST MENU.
2- ENTER [XX] where XX is the subtest number.
3- PRESS the [RETURN] key.
4- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.
5- The test will begin execution. The expected key code and key will be indicated after the command block [DEPRESS].
6- The key code received by the T100 will be displayed after the block [DEPRESSED].

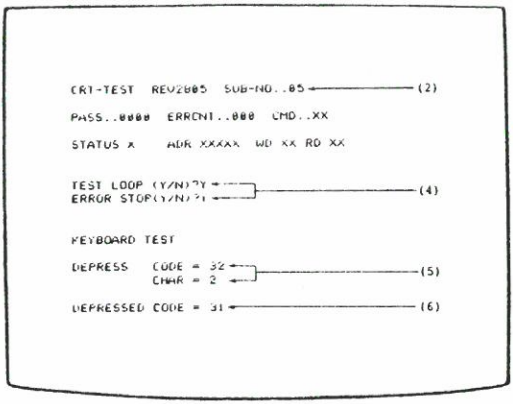


Figure 4.30 CRT SUBTEST MENU

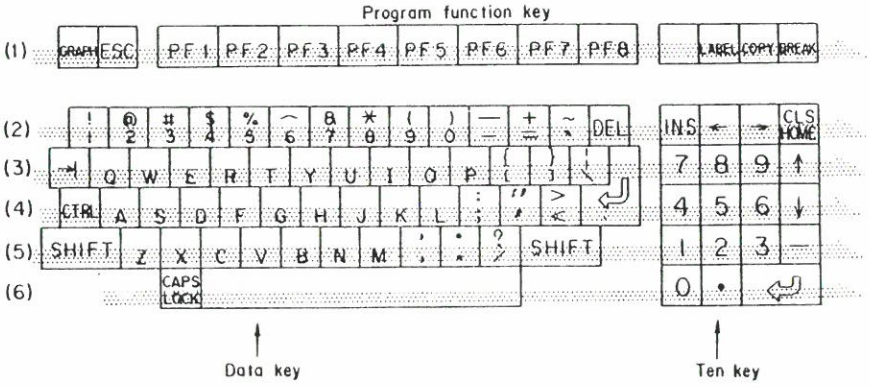


Figure 4.31 CRT Subtest 07

1- PRESS each key on the keyboard in sequence from left to right, top to bottom.
2- Begin with the [GRAPH] key at the upper left of the keyboard.
3- If an operator ERROR occurs during the keyboard test, PRESS the [r] -small r- key and then PRESS the correct key.

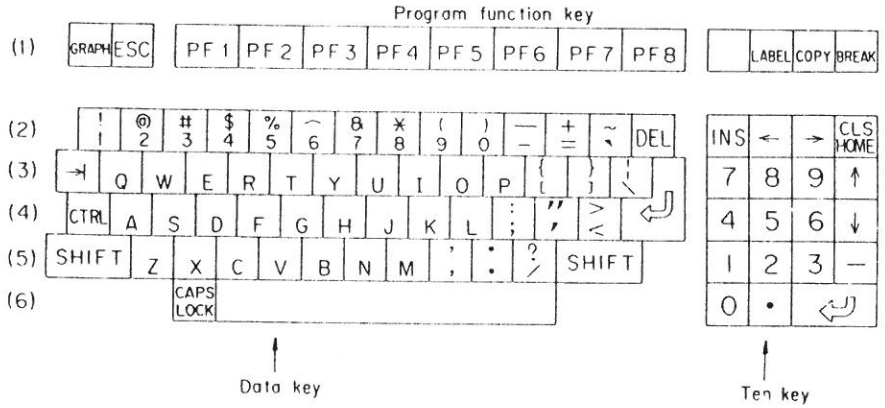


Figure 4.32 Keys for Characters

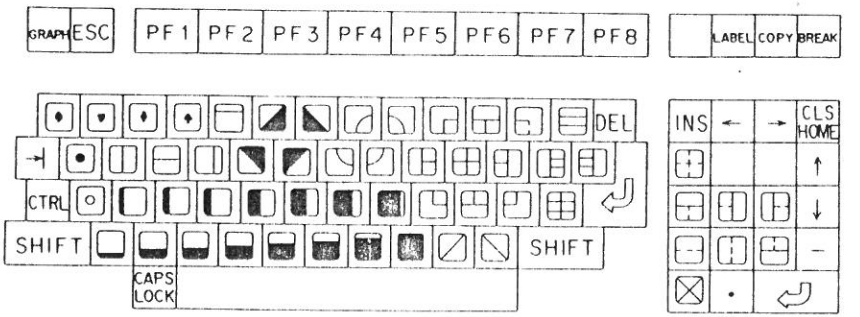


Figure 4.33 Keys for Graphics

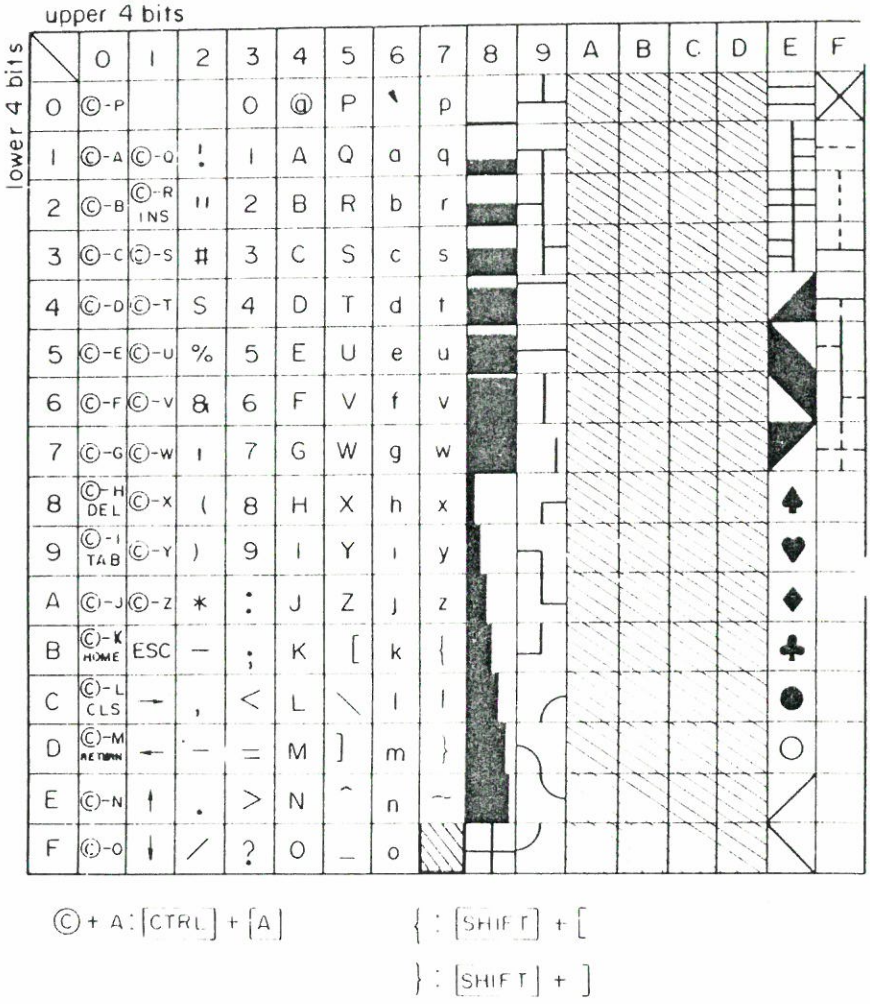


Figure 4.34-1 Keyboard Code Table for T-BASIC

NOTE: The lined areas have no keyboard codes.

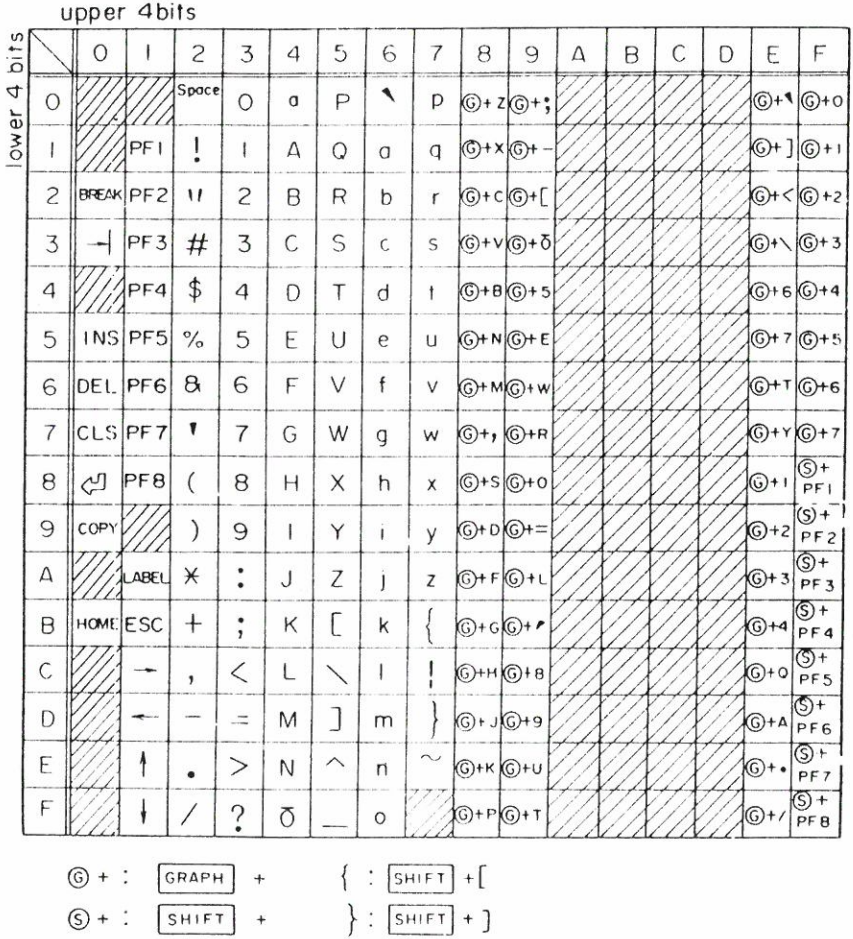


Figure 4.34-2 Keyboard Code Table for OA-BASIC, T&D and PASCAL

NOTE: The lined areas have no keyboard codes.

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

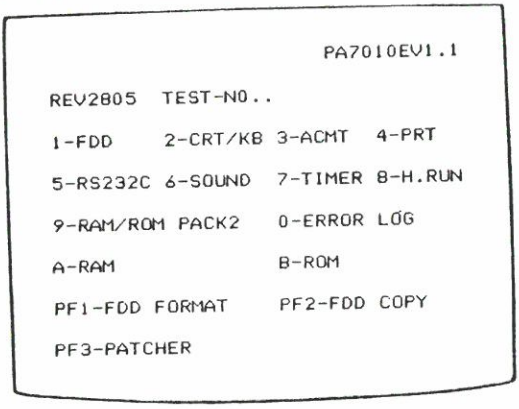


Figure 4.35 TEST MENU

B. ENTER [3] to select the ACMT test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

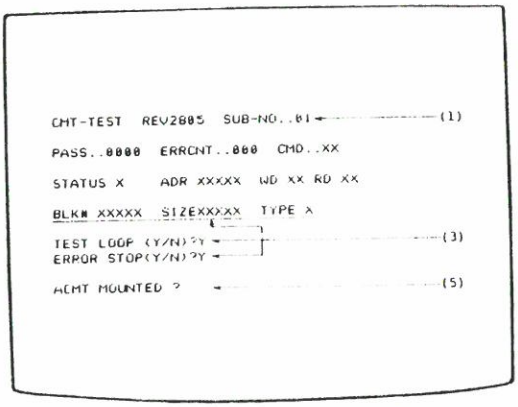


Figure 4.36 ACMT SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.3 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

BLK# XXXXX = Block number
SIZE XXXXX = Data size
TYPE X = Data type

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

4- LOAD a cassette into the cassette recorder.
5- PRESS the [RETURN] key.

Table 4.3 ACMT Subtest Menu

Subtest	Description
01	ACMT write test
02	ACMT read test
03	Data write test
04	Data read test

NOTE: ERASE the start of the cassette tape before running the write test.

Use ONLY high grade cassette tapes.

D. Upon LOADing a cassette and PRESSing the [RETURN] key the test will begin execution. Sample screen displays and test sequences are shown on the following page:

OPERATION of Subtests 01 and 02

```
CMT-TEST  REV2805  SUB-NO..01

PASS..0003  ERRCNT..000  CMD..XX

STATUS X     ADR XXXXX  WD XX RD XX

BLK#      2  SIZE  256  TYPE 8

TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y
```

Figure 4.37 ACMT Subtest 01

```
CMT-TEST  REV2805  SUB-NO..02

PASS..0000  ERRCNT..000  CMD..XX

STATUS X     ADR XXXXX  WD XX RD XX

BLK# XXXXX  SIZEXXXXX  TYPE X

TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y

ACMT MOUNTED ?
```

Figure 4.38 ACMT Subtest 02

OPERATION of Subtests 03 and 04

1- ENTER subtest number. (Refer to Table 4.3 for subtests.)
2- PRESS the [RETURN] key.
3- Test mode is displayed.
4- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.
5- LOAD a cassette into the cassette recorder.
6- PRESS the [RETURN] key.
7- ENTER test data in the form [XX] where X is a hexadecimal character (0 to F).
8- ENTER record size in the form [XXXXX] where XXXXX is a number from 1 to 8192.
9- PRESS the [RETURN] key.
10- ENTER block number in the form [XXXXX] where XXXXX is a block sequence number from 1 to 65535.
11- PRESS the [RETURN] key.

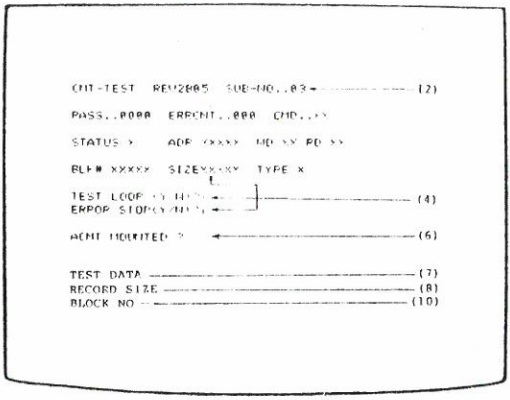

CMT-TEST REV2805 SUB-NO..03 (2)
PASS..0000 ERRCNT..000 CMD..XX
STATUS X ADR XXXX WD XX RD XX
BLK# XXXXX SIZE XXXX TYPE X
TEST LOOP (Y/N)?
ERROR STOP(Y/N)? (4)
ACMT TERMINATED ? (6)
TEST DATA (7)
RECORD SIZE (8)
BLOCK NO (10)

Figure 4.39 ACMT SUBTEST MENU for Subtests 03 and 04

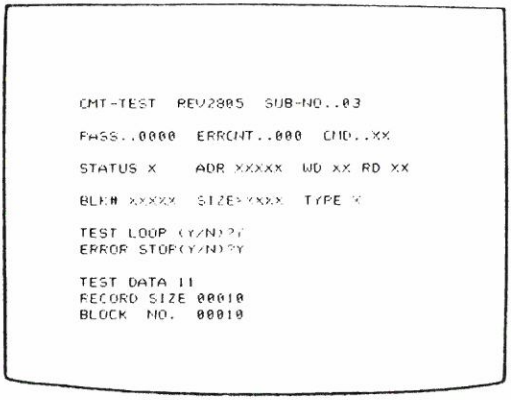


Figure 4.40 ACMT Subtest 03

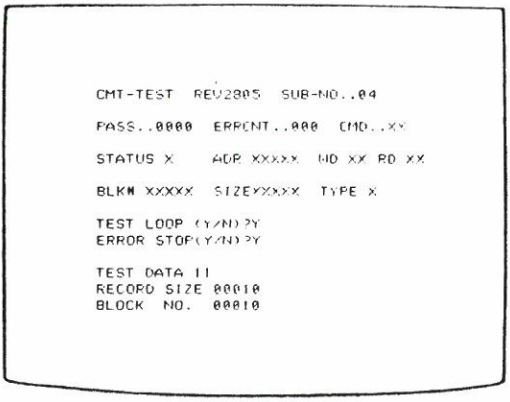


Figure 4.41 ACMT Subtest 04

4.6 Printer Test

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

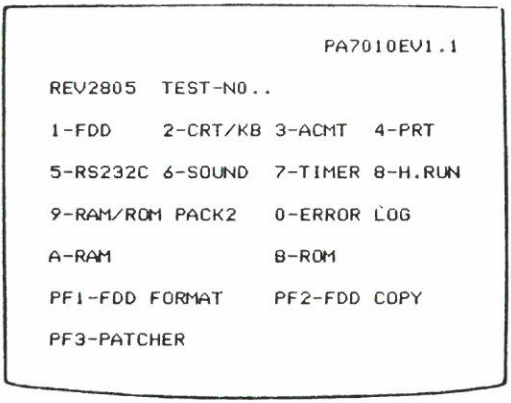


Figure 4.42 TEST MENU

B. ENTER [4] to select the Printer test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

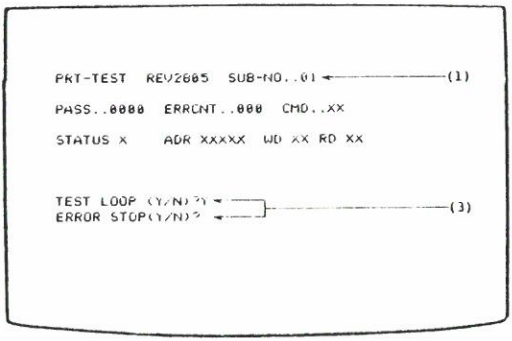


Figure 4.43 Printer SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.4 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

Table 4.4 Printer Subtests

Subtest	Description
01	Character/line test
02	Ripple test
03	Character/graphics test

Before starting the Printer test make sure that:

Paper is inserted in the Printer, and the Printer is selected (SELECT lamp is lit.)

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution. Sample screen displays and test sequences are shown below:

Figure 4.44 Printer Subtest 01

Figure 4.45 Printer Subtest 02

Figure 4.46 Printer Subtest 03

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

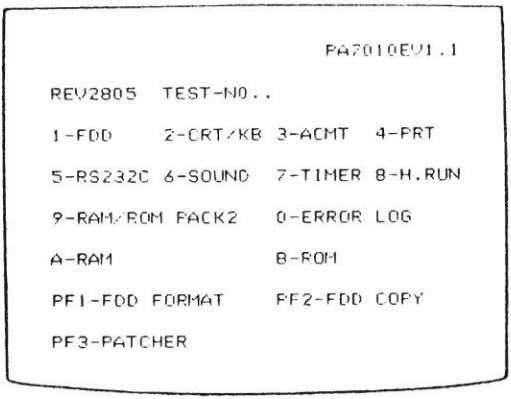


Figure 4.47 TEST MENU

B. ENTER [5] to select the RS232C test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

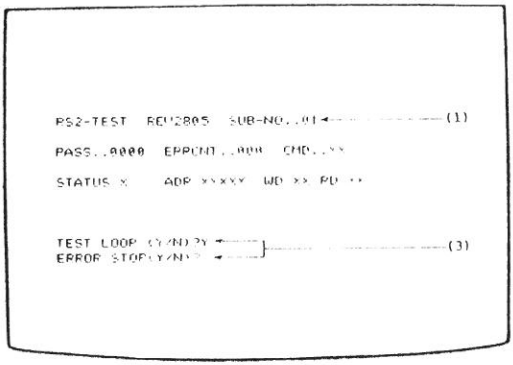


Figure 4.48 RS232C SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.5 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

NOTE: [WD] Write Data and [RD] Read Data are displayed when an ERROR occurs. [WD] is the data transmitted and [RD] is the data received.

Table 4.5 RS232C Subtest

Subtest	Description
01	Loop back test

Part required: Loop back connector

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution.

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

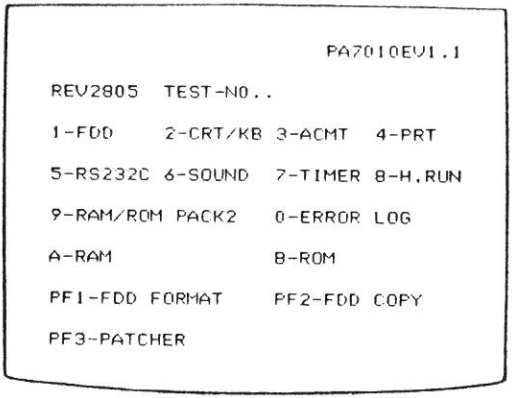


Figure 4.49 TEST MENU

B. ENTER [6] to select the Sound test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

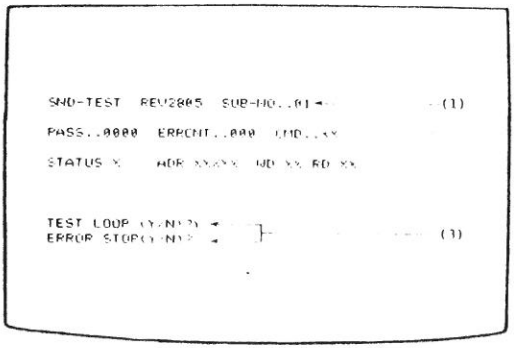


Figure 4.50 Sound SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.6 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)? _ and ERROR STOP (Y/N)? _ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

Table 4.6 Sound Subtest

Subtest	Description
01	Scale test
02	Music test

NOTE: In Subtest 01, the musical scale is generated five (5) times. The notes in the scale are played for 62, 250, 500, 1000 and 2000 milli-seconds, respectively.

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution.

4.9 Timer Test

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

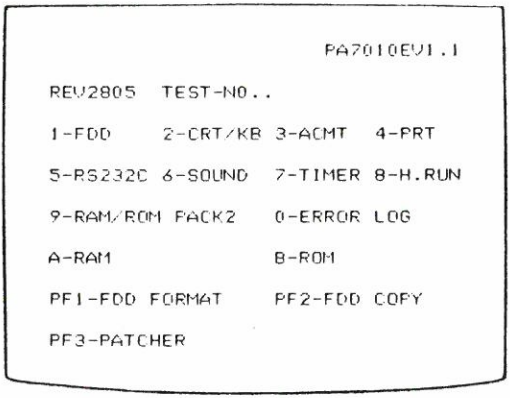


Figure 4.51 TEST MENU

B. ENTER [7] to select the Timer test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

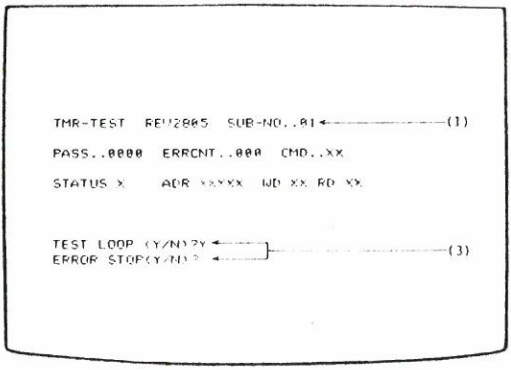


Figure 4.52 Timer SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.7 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

Table 4.7 Timer Subtest

Subtest	Description
01	Time display

NOTE: This test consists of a display of the time elapsed since the program was started. The background color will also be changed during the test.

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution. A sample screen display is shown below:

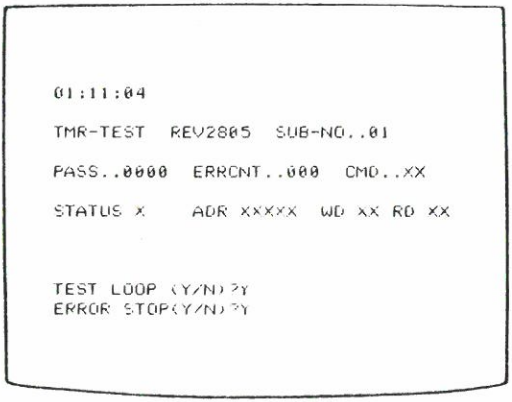


Figure 4.53 Timer Subtest 01

4.10 Burn In (Heat Run) Test

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

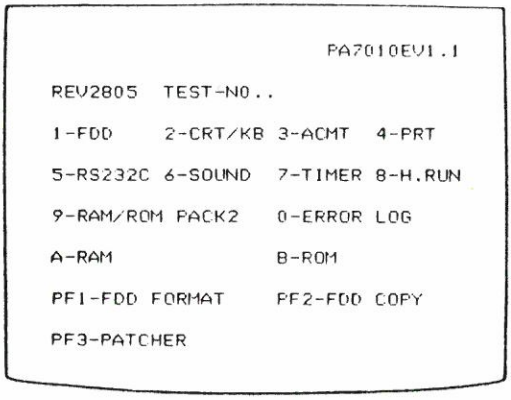


Figure 4.54 TEST MENU

B. ENTER [8] to select the Burn In test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

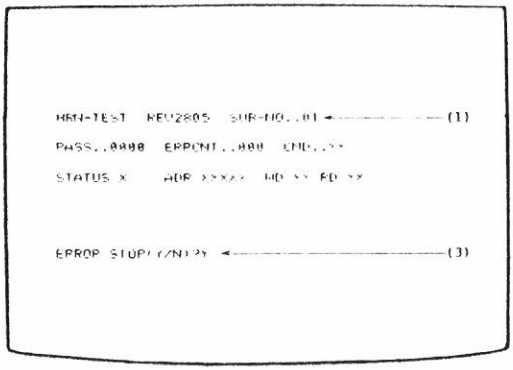


Figure 4.55 Burn In SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.8 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

Table 4.8 Heat-Run Subtest

Subtest	Description
01	Burn In test 1
02	Burn In test 2

NOTE:
a. An ERROR will occur in the FDD tests unless a disk has been inserted in both drives. (Test 01 and 02.)
b. A loop back connector is required for execution of the RS232C test. (Test 02.)
c. A cassette and recorder are required to execute the ACMT tests. (Test 02.)

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution. Sample screen displays and test sequences are shown below:

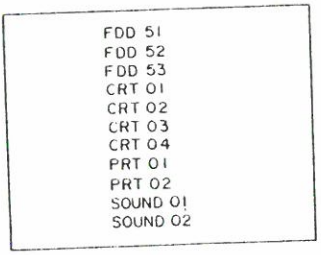


Table 4.9 Sequence of Burn In Subtest 01

```
FDD 53
CRT 03, 08
PRT 03
RS232C 01
SOUND 01
ACMT 03, 04
```

Table 4.10 Sequence of Burn In Subtest 02

4.11 RAM PACK and ROM PACK Test

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

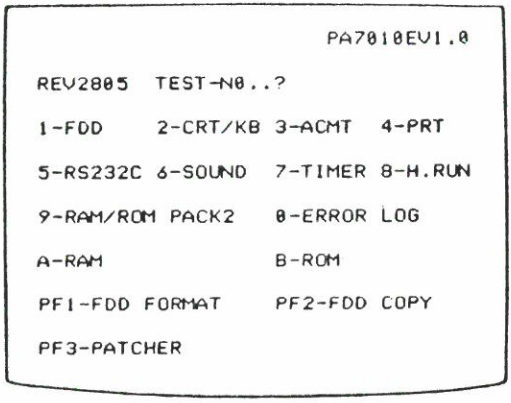


Figure 4.56 TEST MENU

B. ENTER [9] to select the RAM/ROM PACK test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

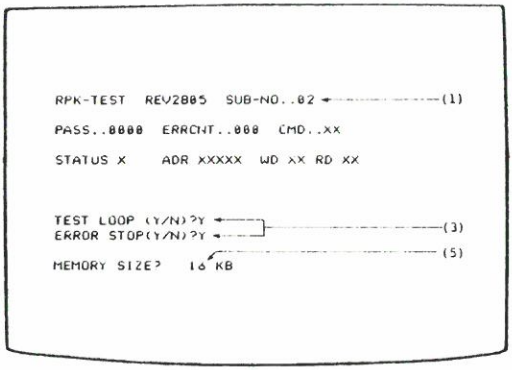


Figure 4.57 RAM/ROM PACK SUBTEST MENU

Table 4.11 RAM/ROM Subtests

Subtest	Description
01	RAM test
02	ROM test

OPERATION of RAM/ROM PACK Subtest 01

1- ENTER subtest number. (Refer to Table 4.11 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

4- MEMORY SIZE? will be displayed.
5- ENTER the memory size as a number from 1 to 32.
6- PRESS the [RETURN] key.

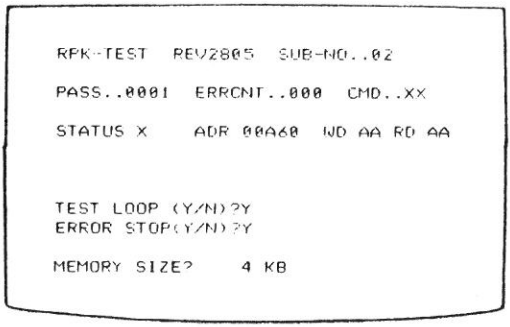


Figure 4.58 RAM/ROM PACK Subtest 01

OPERATION of RAM/ROM PACK Subtest 02

1- ENTER subtest number. (Refer to Table 4.11 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed.

4- ENTER [Y] or [N] as appropriate.
5- MEMORY SIZE? will be displayed.
6- ENTER the memory size as a number from 1 to 32.
7- PRESS the [RETURN] key.
8- ROM TYPE (1)4K BYTE (2)8K BYTE? _ will be displayed.
9- ENTER [1] or [2] as appropriate.
10- Subtest 02 will execute.

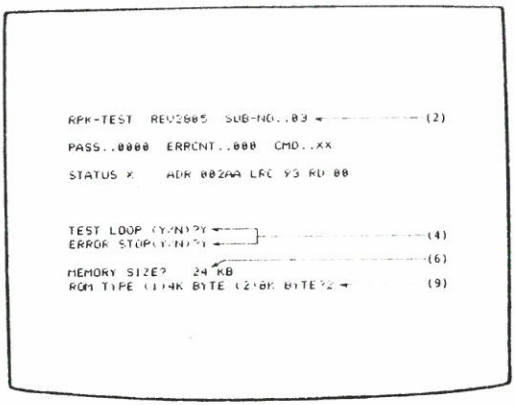


Figure 4.59 RAM/ROM PACK Subtest 02

4.12 Error Logging

PURPOSE

The Error Log allows the Diagnostic operator to execute tests without error stop but retain the ability to view error status.

Error data is recorded and displayed on the screen. The data may be reviewed at any time and may be output to the printer by using the COPY function.

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

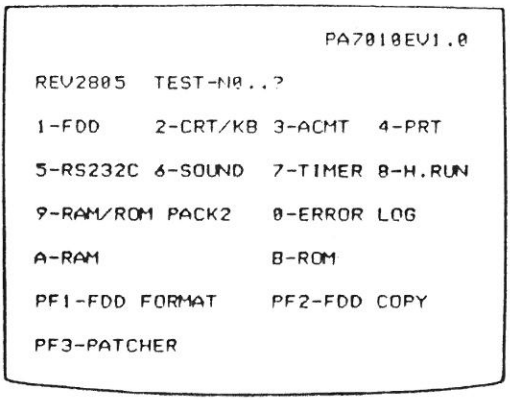


Figure 4.60 TEST MENU

B. ENTER [0] to select Error Logging.
C. PRESS the [RETURN] key. The ERROR LOG will display.

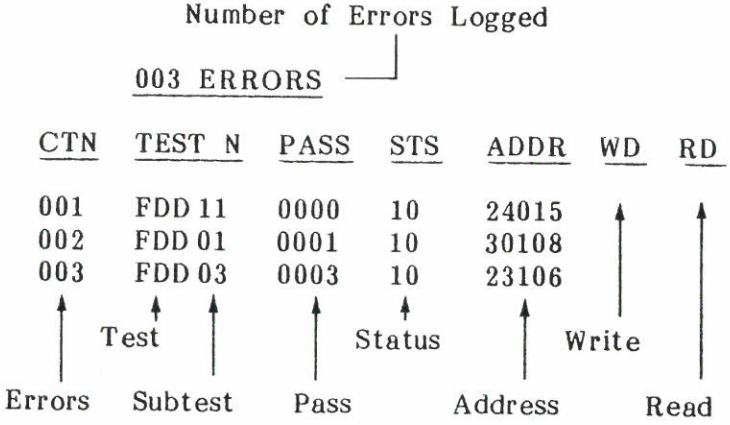


Figure 4.61 ERROR LOG

OPERATION of Error Log

(1) SCROLL the error display UP.

Error log display

PRESS [ ] key.

Error log is scrolled UP line by line.

Figure 4.62 Error Log Operation 1

(2) SCROLL the error display DOWN.

Error log display

PRESS [ ] key.

Error log is scrolled DOWN line by line.

Figure 4.63 Error Log Operation 2

(3) RETURN to the TEST MENU.

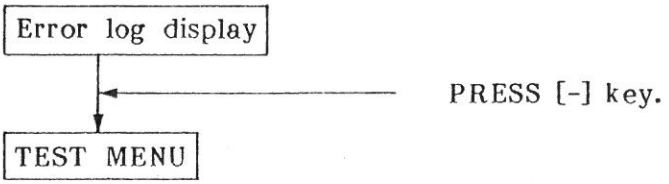


Figure 4.64 Error Log Operation 3

(4) DELETE error log information.

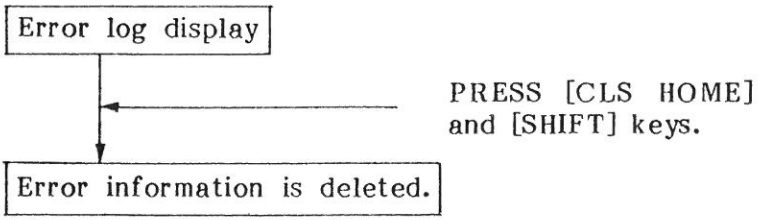


Figure 4.65 Error Log Operation 4

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

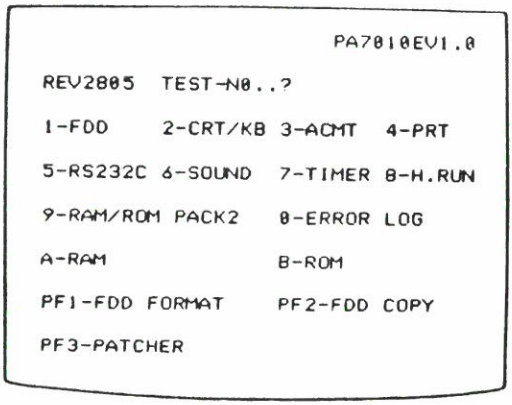


Figure 4.66 TEST MENU

B. ENTER [A] to select the RAM test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

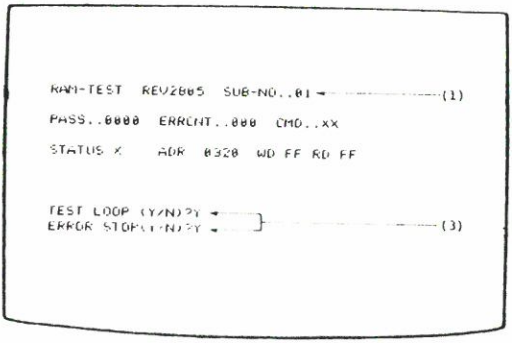


Figure 4.67 RAM SUBTEST MENU

1- ENTER subtest number. (Refer to Table 4.13 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

Table 4.13 RAM Subtests

Subtest	Description
01	RAM test 1
02	RAM test 2
03	RAM test 3
04	Low speed VRAM test
05	High speed VRAM test

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution. Sample screen displays and test sequences are shown below:

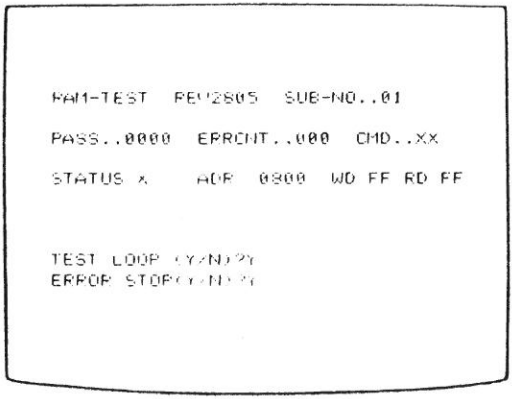


Figure 4.68 RAM Subtest 01

```
RAM-TEST  REV2805  SUB-NO..02

PASS..0000  ERRCNT..000  CMD..XX

STATUS X    ADR  2100  WD 22 RD 22


TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y
```

Figure 4.69 RAM Subtest 02

```
RAM-TEST  REV2805  SUB-NO..03

PASS..0000  ERRCNT..000  CMD..XX

STATUS X    ADR  0E10  WD 1F RD 1F


TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y
```

Figure 4.70 RAM Subtest 03

```
RAM-TEST  REV2805  SUB-NO..04

PASS..0000  ERRCNT..000  CMD..XX

STATUS X    ADR  0050  WD FF RD FF


TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y
```

Figure 4.71 RAM Subtest 04

```
RAM-TEST  REV2805  SUB-NO..05

PASS..0000  ERRCNT..000  CMD..XX

STATUS X    ADR  1D00  WD 55 RD 55


TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y
```

Figure 4.72 RAM Subtest 05

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

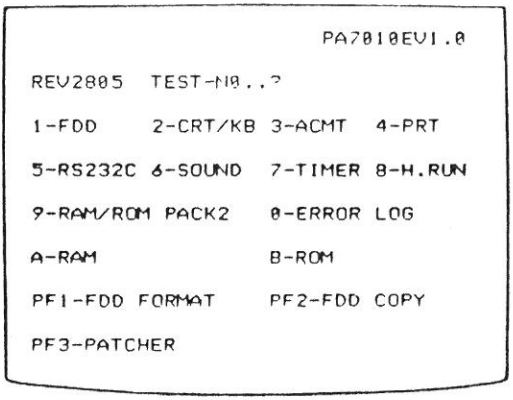


Figure 4.73 TEST MENU

B. ENTER [B] to select the ROM test.
C. PRESS the [RETURN] key. The SUBTEST MENU will display.

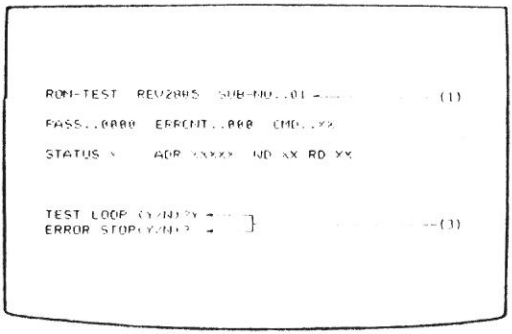


Figure 4.74 ROM SUBTEST MENU for *1

1- ENTER subtest number. (Refer to Table 4.14 for subtests.)
2- PRESS the [RETURN] key.
3- TEST LOOP (Y/N)?_ and ERROR STOP (Y/N)?_ are displayed. ENTER [Y] or [N] as appropriate.

TEST LOOP (Y/N)?_ ENTER [Y] or [N].

Y = Test will execute until terminated by the operator.
N = Test will execute for one (1) pass only.

ERROR STOP (Y/N)?_ ENTER [Y] or [N].

Y = Test execution will stop when an error occurs. (See Notes 1 and 3 in Section 4.3.)
N = Test execution will continue regardless of errors. (See Note 2 in Section 4.3.)

Table 4.14 ROM Subtests

Subtest	Description
*1	ROM test 1
*2	Comparison test
*3	Disk write test

* ROM Type (0 = BASIC ROM)
(1 = ROM PACK 1)

D. Upon completion of the ERROR STOP (Y/N)?_ inquiry, the test will begin execution. Sample screen displays and test sequences are shown below:

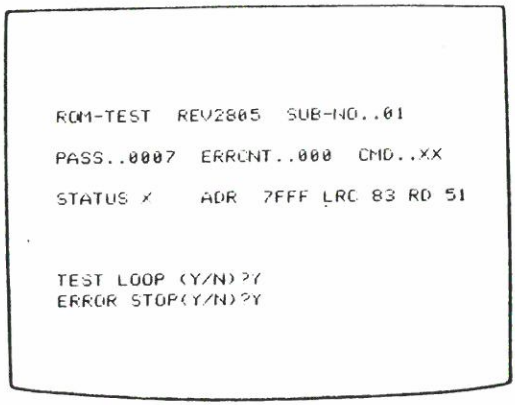


Figure 4.75 ROM Subtest 01

OPERATION of Subtests *2 and *3

1- In the SUBTEST MENU.

2- ENTER [*X] where * is the ROM type and X is the subtest number.
3- PRESS the [RETURN] key.
4- TEST LOOP (Y/N)? and ERROR STOP (Y/N)? are displayed. ENTER [Y] or [N] as appropriate.
5- INSERT a floppy disk into Drive #2 and CLOSE the FDD door.
6- PRESS the [RETURN] key.

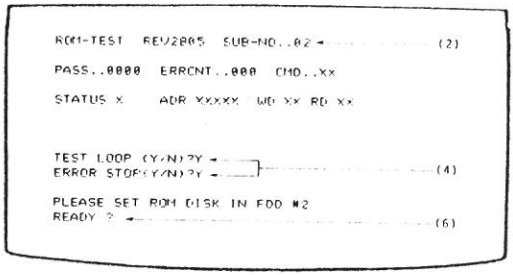


Figure 4.76 ROM SUBTEST MENU for *2 and *3

NOTE: Subtest *3 creates a floppy disk for the use of subtest *2. The disk must be written correctly in *3 before *2 can execute properly.

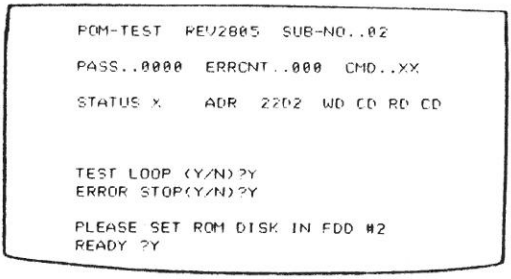

ROM-TEST REV2805 SUB-NO..02
PASS..0000 ERRCNT..000 CMD..XX
STATUS X ADR 2202 WD CD RD CD
TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y
PLEASE SET ROM DISK IN FDD #2
READY ?Y

Figure 4.77 ROM Subtest 02

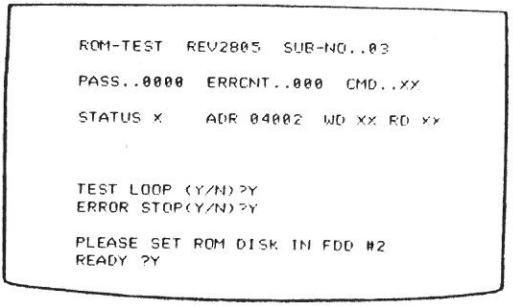

ROM-TEST REV2805 SUB-NO..03
PASS..0000 ERRCNT..000 CMD..XX
STATUS X ADR 04002 WD XX RD XX
TEST LOOP (Y/N)?Y
ERROR STOP(Y/N)?Y
PLEASE SET ROM DISK IN FDD #2
READY ?Y

Figure 4.78 ROM Subtest 03

4.15 Floppy Disk Format Program

PURPOSE

Prior to the use of a floppy disk, the disk must be written with the format the program/system is expecting. This program will write the disk with the format required by the Diagnostic tests.

CAUTION

The format written by this program is intended for use with the Diagnostic tests. This format may not be compatible with data disks for the customer's application programs.

ALL DATA ON THE DISK BEING FORMATTED WILL BE LOST.

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

```
                                PA7010EV1.0

REV2805  TEST-NO..?

1-FDD     2-CRT/KB 3-ACMT   4-PRT

5-RS232C 6-SOUND   7-TIMER  8-H.RUN

9-RAM/ROM PACK2    0-ERROR LOG

A-RAM              B-ROM

PF1-FDD FORMAT     PF2-FDD COPY

PF3-PATCHER
```

Figure 4.79 TEST MENU

B. ENTER [PF1] to select the Format Program.
C. PRESS the [RETURN] key. The FORMAT SCREEN will display.

```
MOUNT DISK #2 AND DEPRESS PF1 <-------------(2)
.....
.....
.....
.....END
MOUNT DISK #2 AND DEPRESS PF1
```

Figure 4.80 FORMAT SCREEN

1- MOUNT a floppy disk in drive #2.
2- PRESS the [PF1] key.
3- The Format Program will begin execution.

If an error occurs during formatting:

RETRY by PRESSing the [PF1] key. If the error occurs again, use a different floppy disk.

```
MOUNT DISK #2 AND DEPRESS PF1
......BAD
MOUNT DISK #2 AND DEPRESS PF1
```

Figure 4.81 Formatting Error Message

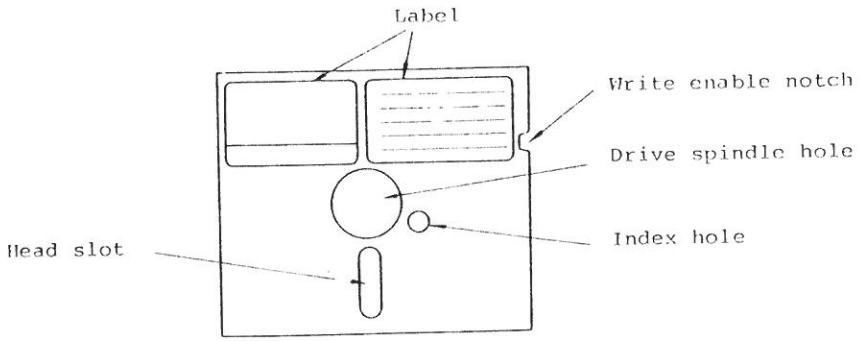


Figure 4.82 Floppy Disk

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

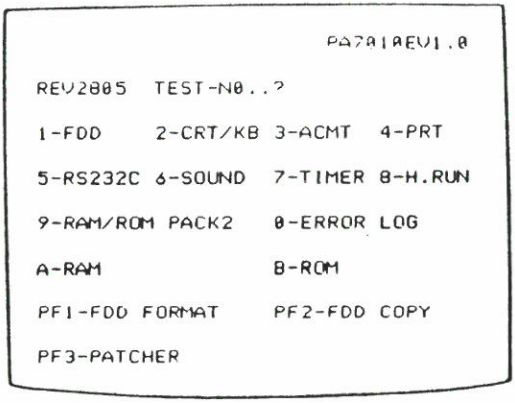


Figure 4.83 TEST MENU

B. ENTER [PF2] to select the Copy Program.
C. PRESS the [RETURN] key. The COPY SCREEN will display.

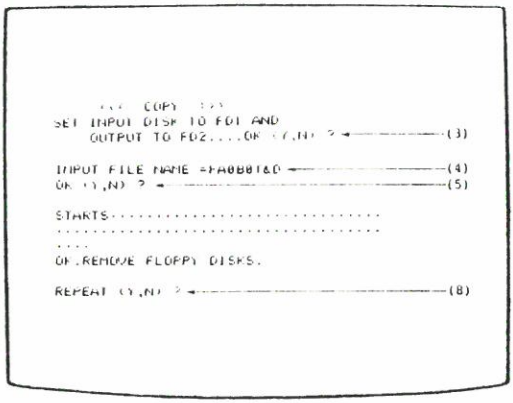


Figure 4.84 COPY SCREEN

1- FOLLOW the instructions on the screen.
2- MOUNT the SOURCE DISK in drive #1, the NEW DISK in drive #2.

```
MOUNT DISK #2 AND DEPRESS PF1 <-------------(2)
.....
.....
.....
.....END
MOUNT DISK #2 AND DEPRESS PF1
```

Figure 4.80 FORMAT SCREEN

1- MOUNT a floppy disk in drive #2.
2- PRESS the [PF1] key.
3- The Format Program will begin execution.

If an error occurs during formatting:

RETRY by PRESSing the [PF1] key. If the error occurs again, use a different floppy disk.

```
MOUNT DISK #2 AND DEPRESS PF1
......BAD
MOUNT DISK #2 AND DEPRESS PF1
```

Figure 4.81 Formatting Error Message

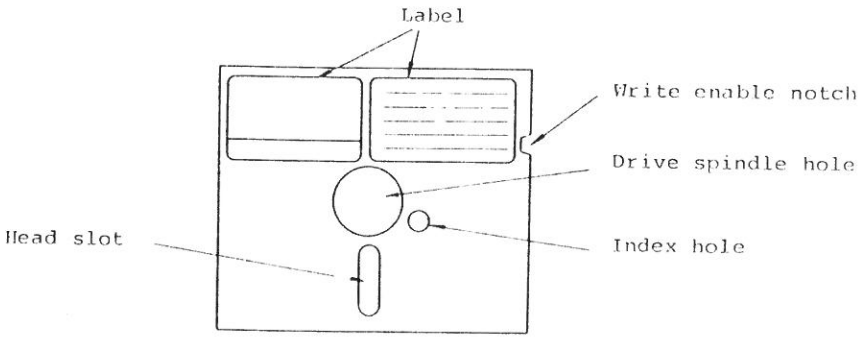


Figure 4.82 Floppy Disk

4.16 Floppy Disk Copy Program

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)

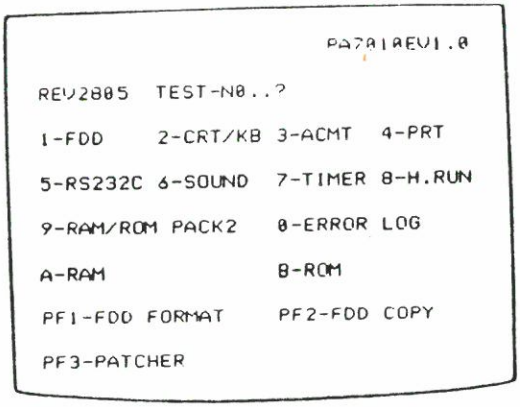


Figure 4.83 TEST MENU

B. ENTER [PF2] to select the Copy Program.
C. PRESS the [RETURN] key. The COPY SCREEN will display.

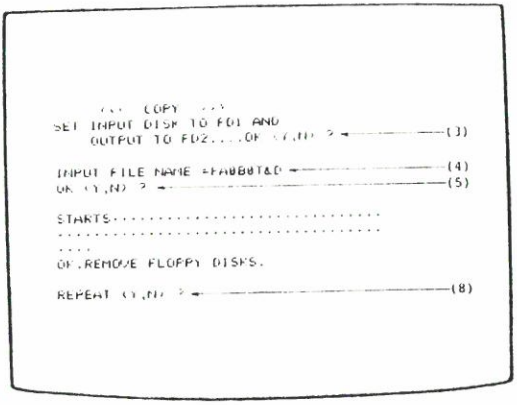


Figure 4.84 COPY SCREEN

1- FOLLOW the instructions on the screen.
2- MOUNT the SOURCE DISK in drive #1, the NEW DISK in drive #2.

3- PRESS the [Y] key when ready to proceed.
4- The source volume name will be displayed.
5- PRESS the [Y] key if the volume name is correct.
6- The COPY Program will execute.
7- When the copy is complete, REPEAT (Y,N)?_ will be displayed.
8- ENTER [Y] or [N] as appropriate.

This program is intended for copying Diagnostic disks.

Disks which do not contain a volume name which can be read by this program cannot be copied using the COPY Program.

If the volume name cannot be identified, the following will be displayed:

```
INPUT FILE NAME =
FD1 ERROR

REPEAT (Y,N) ?
```

Figure 4.85 Error Message for COPY

4.17 Patch Program

CAUTION

EXTREME caution should be used when executing this program. The ability to modify memory or disk by the use of this program requires a knowledge of machine language programming and this program should ONLY be used on Diagnostic tests.

PURPOSE

This program allows the field modification of Diagnostic tests.

4.17.1 PATCH to Floppy Disk

a. The first sector on the floppy disk is the header.
b. The program is written to sector two and beyond as required.

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)
B. ENTER [PF3] to select the Patch Program.
C. PRESS the [RETURN] key. FDD READY? will be displayed.
D. MOUNT a floppy disk in drive #2. PRESS the [RETURN] key.
E. The FDD track, head and sector numbers will be displayed.
F. PRESS the [RETURN] key if the data is correct.
G. ADDRESS? will be displayed.
H. ENTER the program start address in the form [XXXX] where XXXX is the four (4) digit start address.
I. The data in the specified address will be displayed.
J. PRESS the [RETURN] key. The address counter will be incremented and the data will be displayed.
K. ENTER the new data in the form [XX].

L. PRESS the [RETURN] key to advance the address counter.

When the patch is complete:

M. PRESS the [DEL] key. The Patch Program will return to step C.
N. PRESS the [DEL] key. The program will exit to the TEST MENU.

VERIFICATION

Turn OFF the ON/OFF switch and then turn it ON to load and verify the operation of the patch.

4.17.2 Patch to Memory

To execute a patch to the contents of memory, PRESS the [M] key in step D.

PROCEDURE

A. LOAD the test program. The TEST MENU will display. (Refer to Section 4.2.1 or 4.2.2 for load instructions.)
B. ENTER [PF3] to select the Patch Program.
C. PRESS the [RETURN] key. FDD READY? will be displayed.
D. PRESS the [M] key.
E. *** CLUB ***
ADDRESS? will be displayed.
F. ENTER the program start address in the form [XXXX] where XXXX is the four (4) digit start address.
G. The data in the specified address will be displayed.
H. PRESS the [RETURN] key. The address counter will be incremented and the data will be displayed.
I. ENTER the new data in the form [XX].
J. PRESS the [RETURN] key to advance the address counter.

When the patch is complete:

K. PRESS the [DEL] key. The Patch Program will return to step C.
L. PRESS the [DEL] key. The program will exit to the TEST MENU.

VERIFICATION

RUN the program to verify the operation of the patch.

GENERAL

PRESSing the down-cursor [ ] key will decrement the address counter.
PRESSing the up-cursor [ ] key will increment the address counter.

4.18 Expansion Unit

(To be supplied)

5. REMOVAL AND REPLACEMENT

5.1 CPU/Keyboard

Figure 5.1.1 shows the names of the components of the T100 CPU/Keyboard.

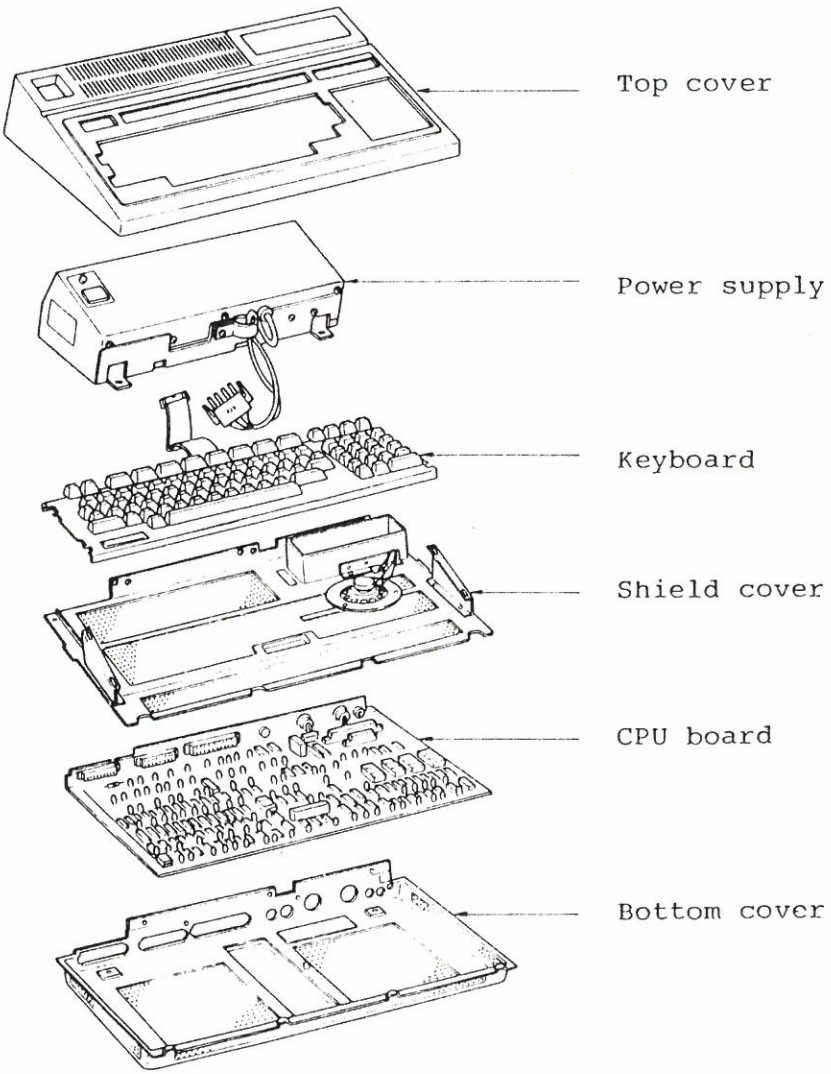


Figure 5.1.1 T100 CPU/Keyboard

5.1.1 Top Cover

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the four (4) screws on the back and the four (4) screws on the bottom of the T100 CPU/Keyboard.
3. Remove the top cover.

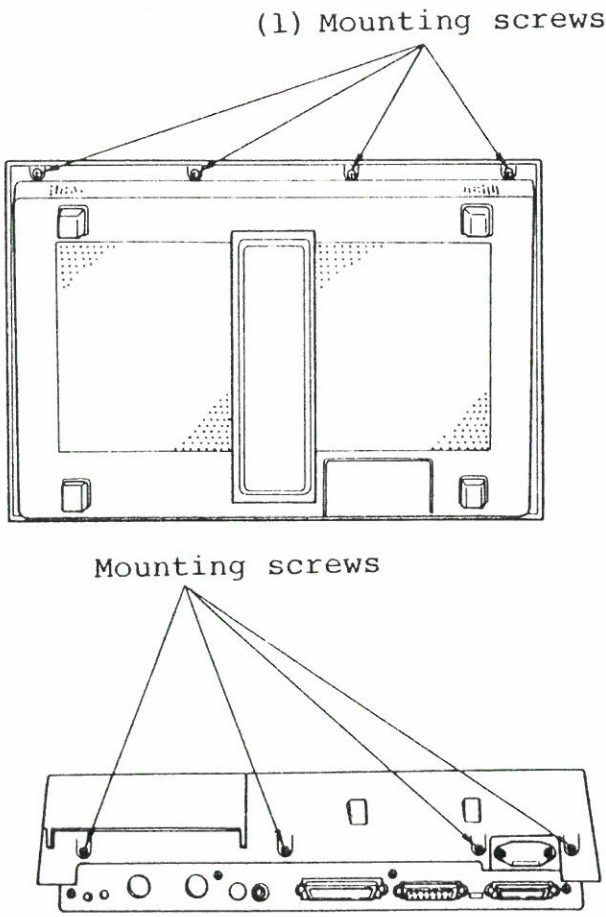


Figure 5.1.2 Removal of the Top Cover

REPLACEMENT

1. Reverse the procedure described under Removal.

5.1.2 Power Supply

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 CPU/Keyboard. (Refer to 5.1.1.)
3. Disconnect the power cable from the PJ4 connector of the CPU board and the four (4) power supply mounting screws, then remove the power supply.

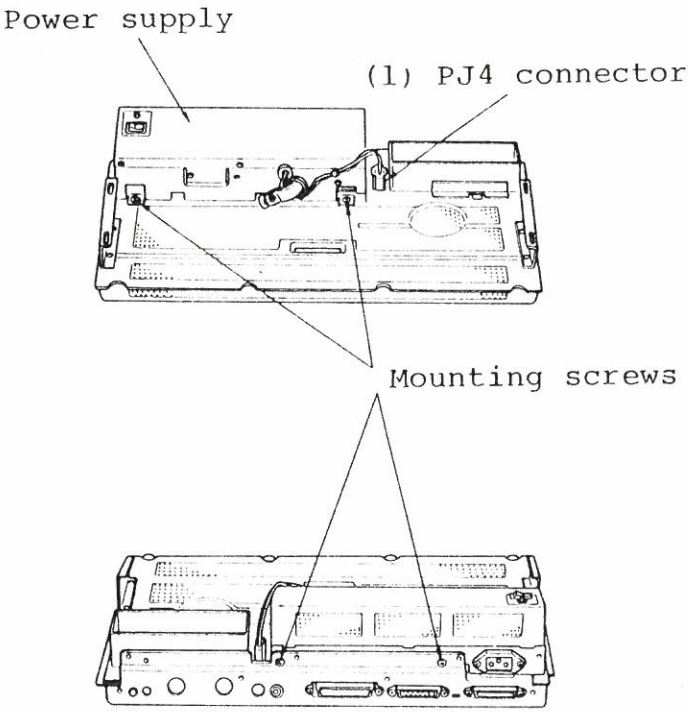


Figure 5.1.3 Removal of the Power Supply

REPLACEMENT

1. Reverse the procedure described under Removal.
2. Verify the power supply voltages are correct. (Refer to Section 6.1.1.)

5.1.3 Keyboard

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 CPU/Keyboard. (Refer to 5.1.1.)
3. Disconnect the keyboard cable from the PJ7 connector on the CPU board and remove the keyboard.

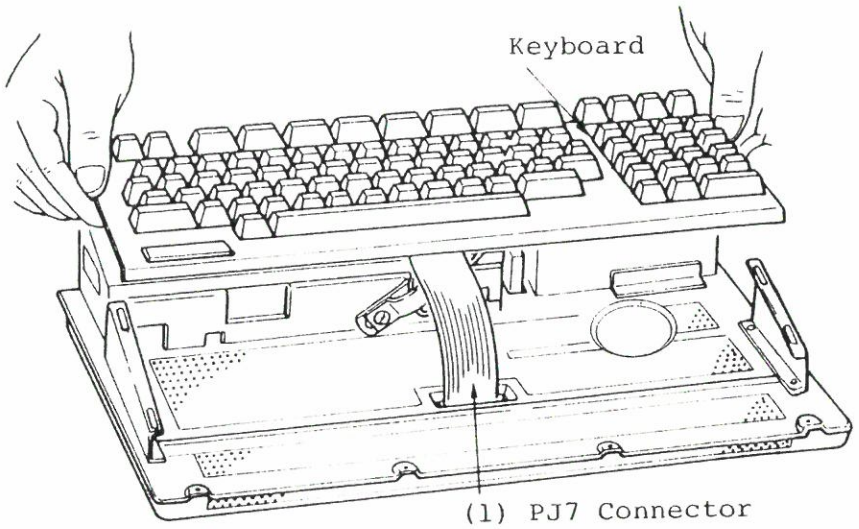


Figure 5.1.4 Removal of the Keyboard

REPLACEMENT

1. Reverse the procedure described under Removal. (Refer to Figure 5.1.5 for installation of the keyboard connector.)

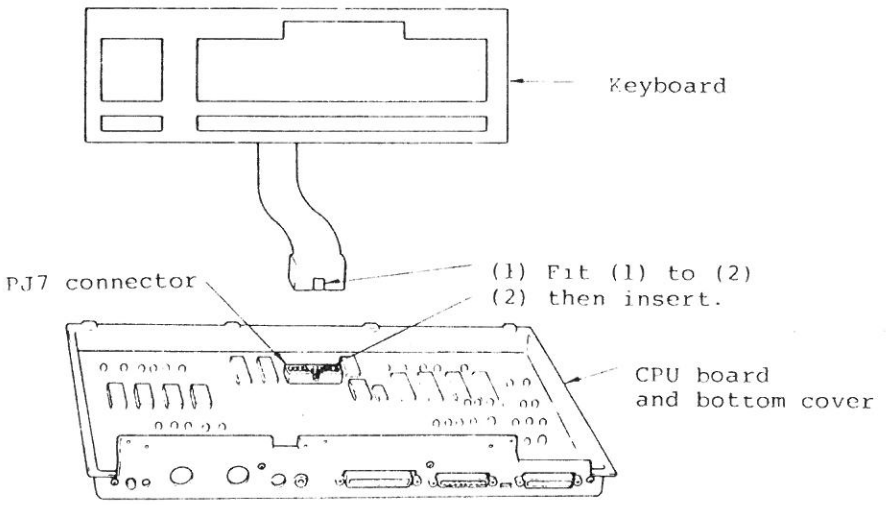


Figure 5.1.5 Installation of the Keyboard Connector

5.1.4 CPU Board

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 CPU/Keyboard. (Refer to 5.1.1.)
3. Remove the power supply. (Refer to 5.1.2.)
4. Remove the keyboard. (Refer to 5.1.3.)
5. Remove the PJ6 connector of the speaker cable from the CPU board as shown in Figure 5.1.7 and the two (2) screws for the shield cover as shown in Figure 5.1.6, then remove the shield cover.
6. Remove the four (4) screws on the back of the T100 CPU/Keyboard and the four (4) screws on the CPU board. (Refer to Figure 5.1.6.)

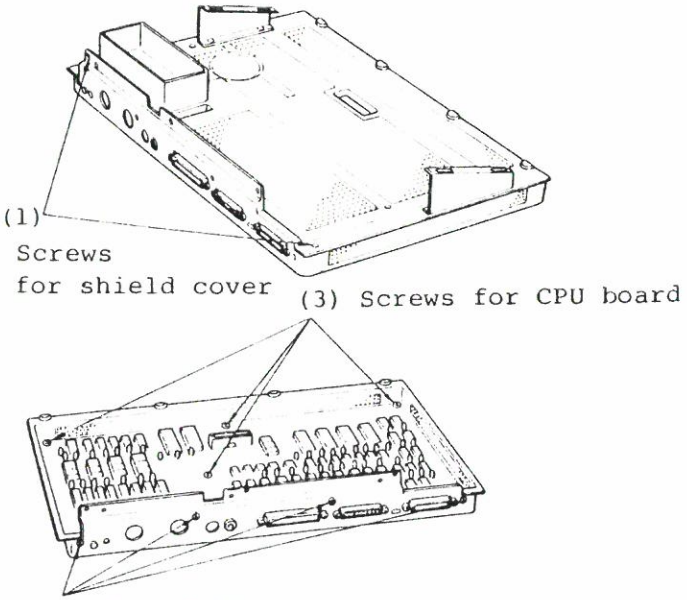


Figure 5.1.6 Removal of the CPU Board

REPLACEMENT

1. Reverse the procedure described under Removal.

5.1.5 Speaker

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 CPU/Keyboard. (Refer to 5.1.1.)
3. Remove the keyboard. (Refer to 5.1.3.)
4. Remove the PJ6 connector of the speaker cable from the CPU board and the three (3) speaker mounting screws, then remove the speaker.

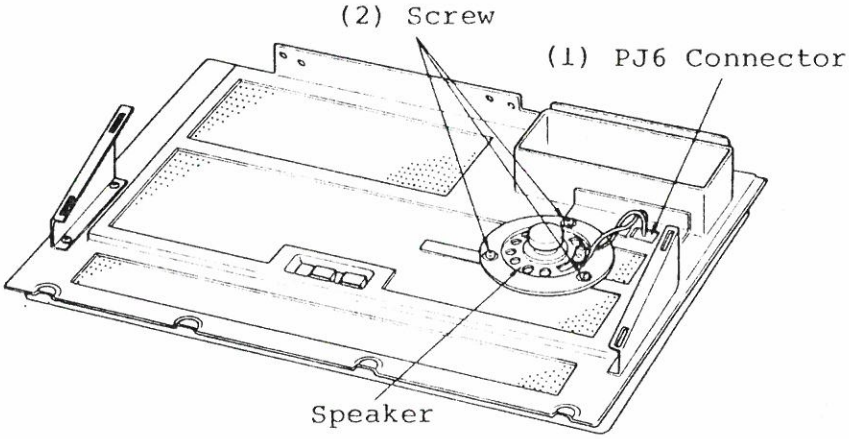


Figure 5.1.7 Removal of the Speaker

REPLACEMENT

1. Reverse the procedure described under Removal.

5.1.6 ROM/RAM, and Other LSI Chips

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 CPU/Keyboard. (Refer to 5.1.1.)
3. Remove the power supply. (Refer to 5.1.2.)
4. Remove the keyboard. (Refer to 5.1.3.)
5. Remove the PJ6 connector of the speaker cable from the CPU board as shown in Figure 5.1.7 and the two (2) screws for the shield cover as shown in Figure 5.1.6, then remove the shield cover.
6. Remove the ROM/RAM from the IC socket as follows:

   Insert a (-) screwdriver between the ROM/RAM and the IC socket and raise the ends of the ROM/RAM alternately. Remove other LSI chips in the same manner as above.

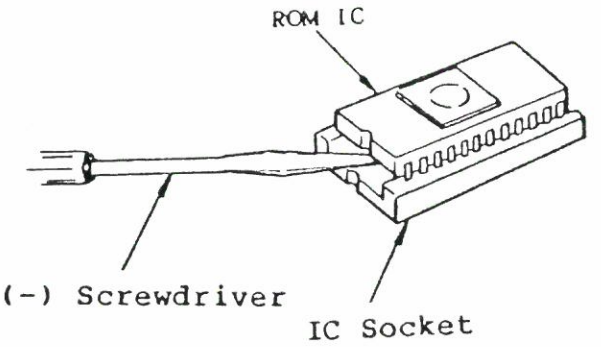


Figure 5.1.8 Removal of ROM/RAM and Other LSI Chips

REPLACEMENT

Reinstall ROM/RAM and other LSI chips in the appropriate socket carefully. Use special care to insure that all pins are located correctly in the socket. The installation positions of ROM/RAM and other LSI chips are shown in Figure 5.1.9, Figure 5.1.10 and Table 5.1.1.

ROM/RAM and Other LSI Chip Positions

The BASIC ROM's (ROM 1 to ROM 4) and the CG-ROM are installed in IC sockets on the CPU board. The appropriate installation positions are indicated in Figure 5.1.9.

The ROM number is written on each PACK. Install the ROM in the location specified by its ROM number.

ROM numbers and their respective installation position numbers are shown in Figure 5.1.10 and Table 5.1.1.

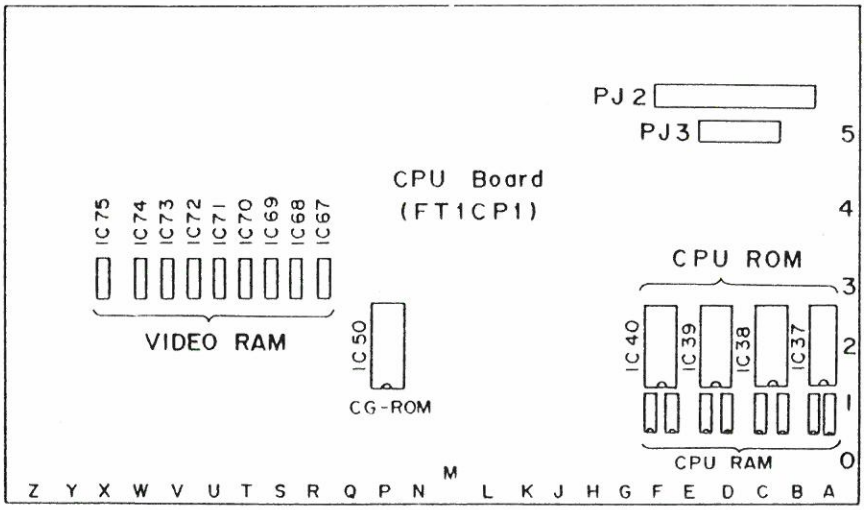


Figure 5.1.9 Positions of ROM/RAM and Other LSI Chips

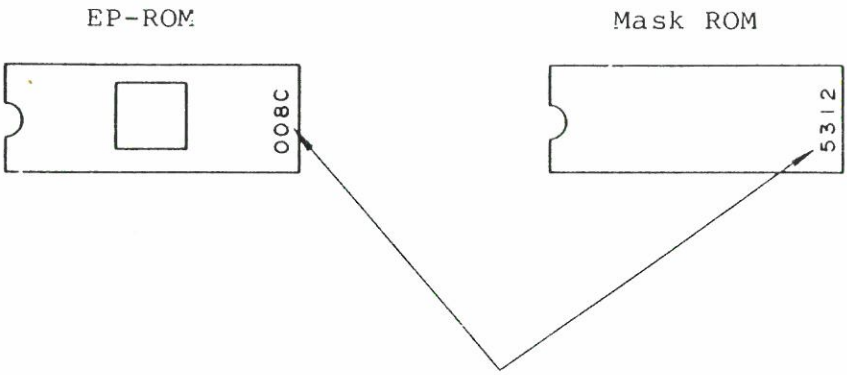


Figure 5.1.10 Position of ROM Numbers

Table 5.1.1 ROM Numbers

ROM Name	Number	Location
BASIC ROM1	6016	2A (IC37)
BASIC ROM2	8617	2C (IC38)
BASIC ROM3	8618	2D (IC39)
BASIC ROM4	6019	2F (IC40)
CG-ROM	5320	2P (IC50)

5.2 Floppy Disk Drive Unit (FDD)

Figure 5.2.1 shows the names of the components of the T100 FDD.

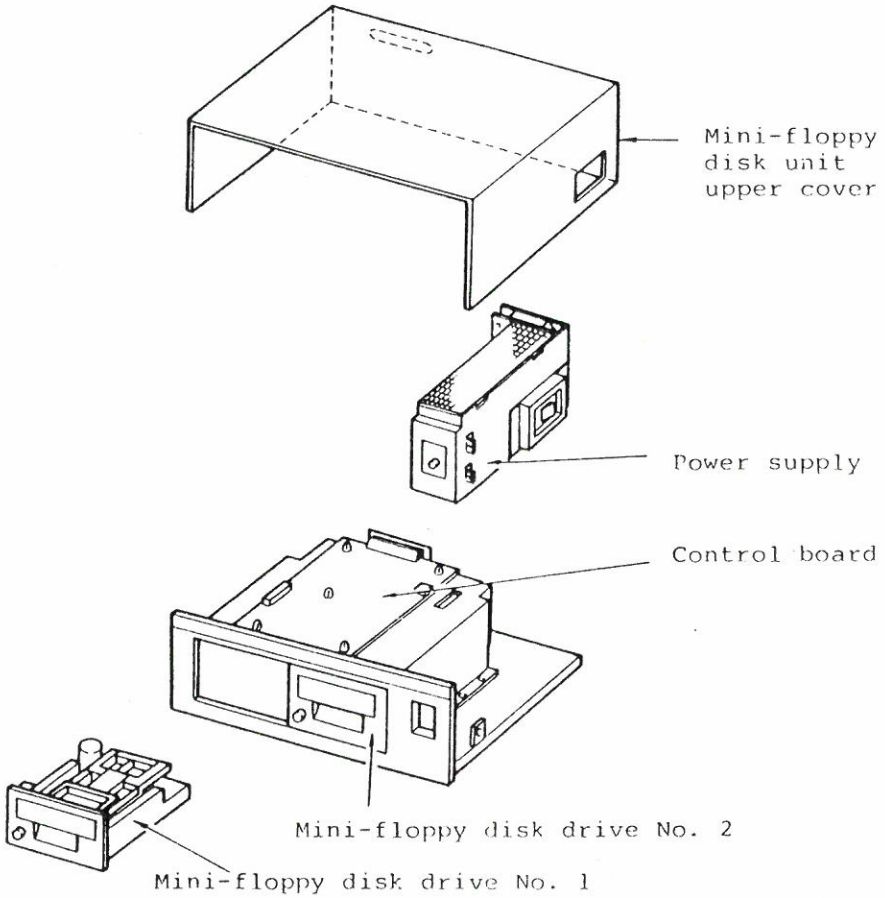


Figure 5.2.1 T100 Floppy Disk Drive Unit

5.2.1 Top Cover

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Disconnect the FDD I/O cable from the Floppy Disk Drive Unit.
3. Remove the six (6) screws on the sides and back of the FDD.
4. Remove the top cover.

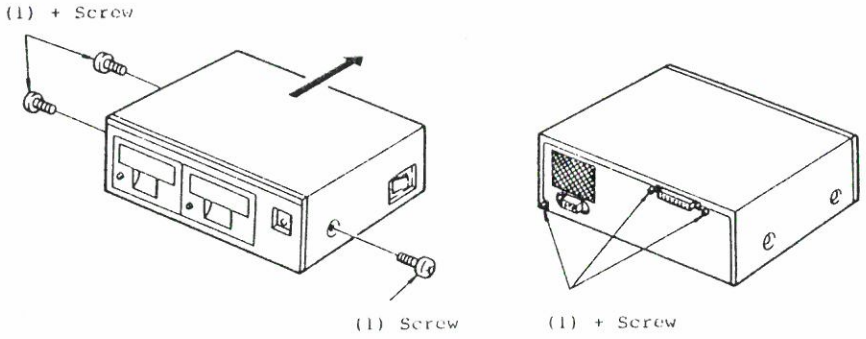


Figure 5.2.2 Removal of the Top Cover

REPLACEMENT

1. Reverse the procedure described under Removal.

5.2.2 FDD Controller

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 FDD. (Refer to 5.2.1.)
3. Disconnect the signal cable from PJ2 and the power cable from PJ3.
4. Remove the five (5) mounting screws and remove the FDD Controller.

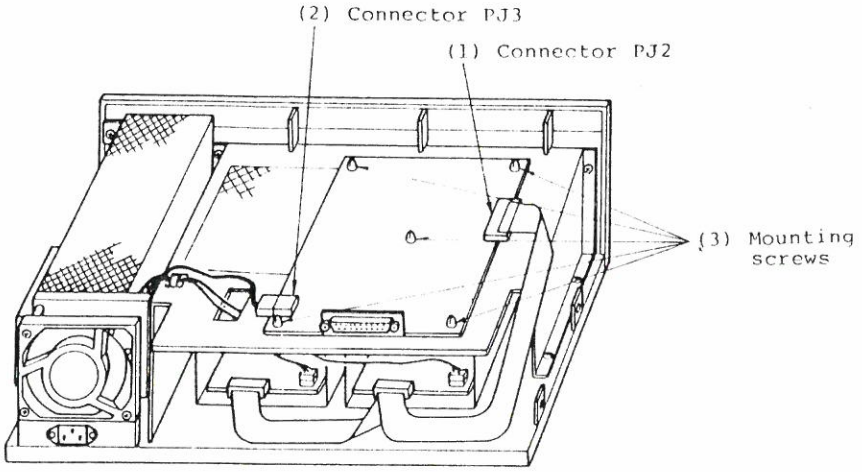


Figure 5.2.3 Removal of the FDD Controller

REPLACEMENT

1. Reverse the procedure described under Removal.

5.2.3 Power Supply

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 FDD. (Refer to 5.2.1.)
3. Disconnect the power cable from the PJ3 connector of the FDD Controller and the two (2) power cables for the floppy disk drives. (Refer to Figure 5.2.4.)
4. Remove the power cable clamp.
5. Remove the two (2) power supply mounting screws on the side of the supply and the three (3) screws on the bottom of the unit.
6. Remove the power supply.

REPLACEMENT

1. Reverse the procedure described under Removal.
2. Verify the power supply voltages are correct. (Refer to Section 6.2.1.)

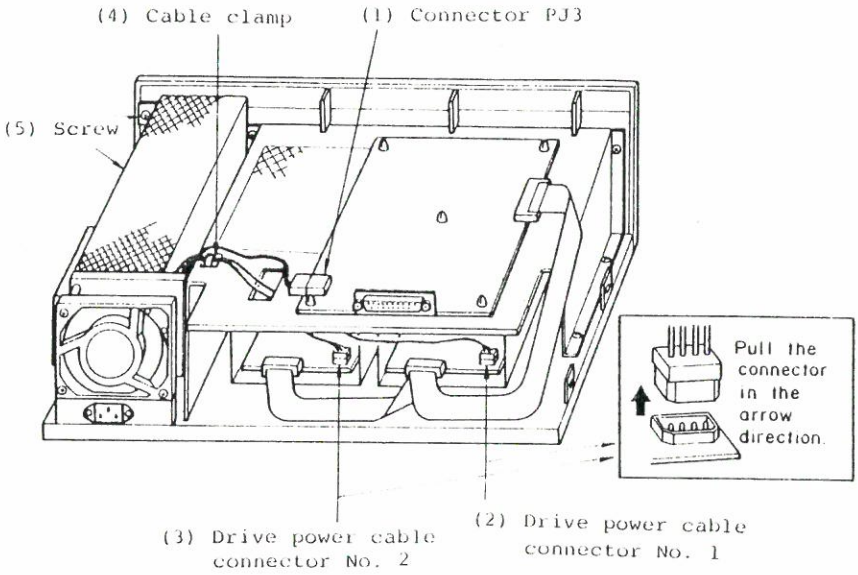

(4) Cable clamp
(1) Connector PJ3
(5) Screw
Pull the connector in the arrow direction.
(3) Drive power cable connector No. 2
(2) Drive power cable connector No. 1

Figure 5.2.4 Removal of Power Supply (1)

5.2.2 FDD Controller

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 FDD. (Refer to 5.2.1.)
3. Disconnect the signal cable from PJ2 and the power cable from PJ3.
4. Remove the five (5) mounting screws and remove the FDD Controller.

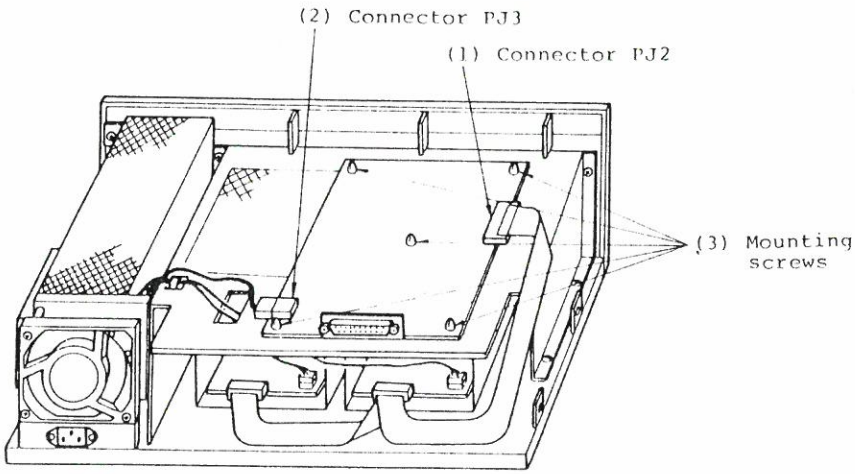


Figure 5.2.3 Removal of the FDD Controller

REPLACEMENT

1. Reverse the procedure described under Removal.

5.2.3 Power Supply

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 FDD. (Refer to 5.2.1.)
3. Disconnect the power cable from the PJ3 connector of the FDD Controller and the two (2) power cables for the floppy disk drives. (Refer to Figure 5.2.4.)
4. Remove the power cable clamp.
5. Remove the two (2) power supply mounting screws on the side of the supply and the three (3) screws on the bottom of the unit.
6. Remove the power supply.

REPLACEMENT

1. Reverse the procedure described under Removal.
2. Verify the power supply voltages are correct. (Refer to Section 6.2.1.)

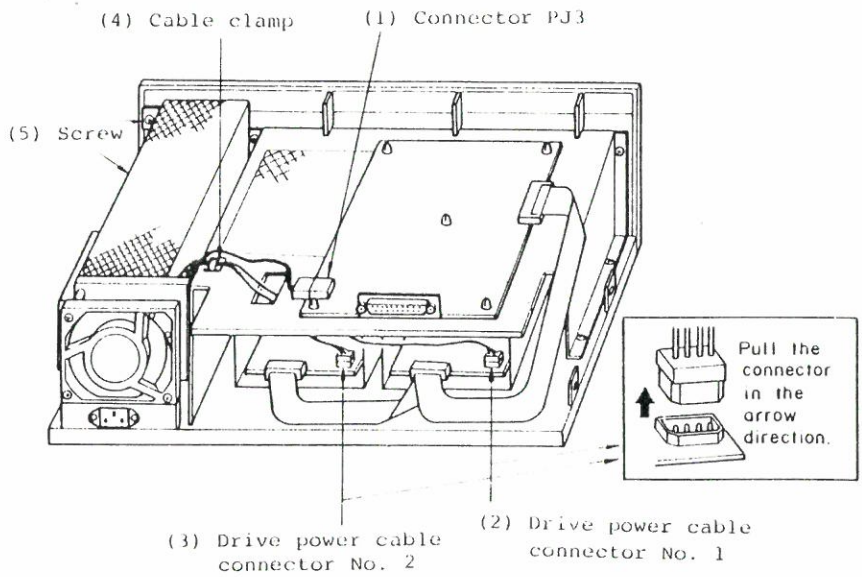

(4) Cable clamp
(1) Connector PJ3
(5) Screw
Pull the connector in the arrow direction.
(3) Drive power cable connector No. 2
(2) Drive power cable connector No. 1

Figure 5.2.4 Removal of Power Supply (1)

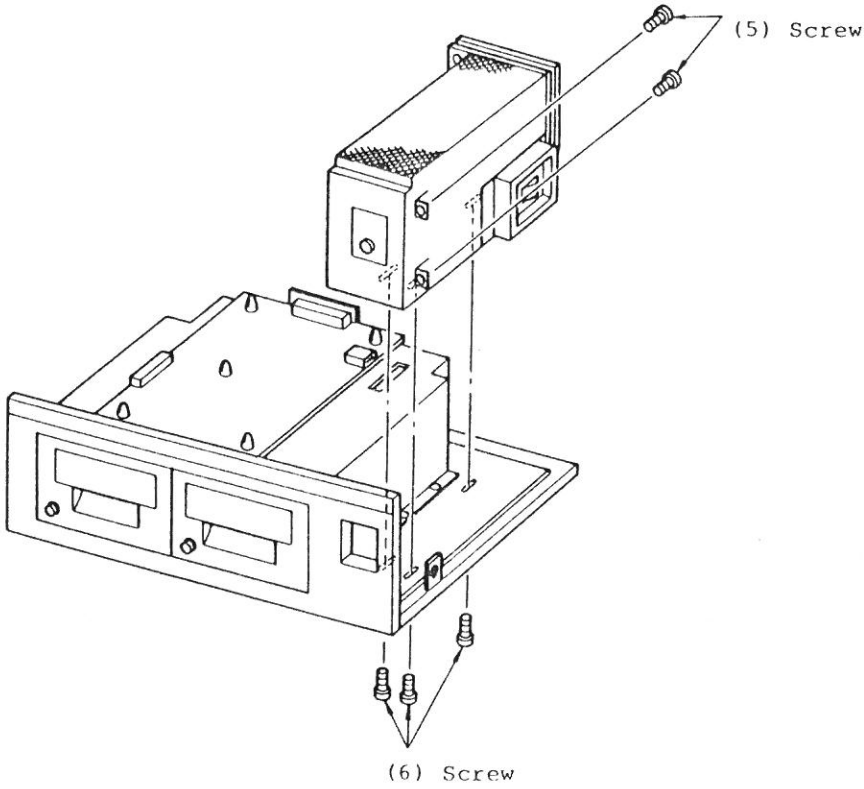


Figure 5.2.5 Removal of Power Supply (2)

5.2.4 Floppy Disk Drive

REMOVAL

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 FDD. (Refer to 5.2.1.)
3. Disconnect the signal cable connected to the FDD. (Refer to Figure 5.2.6.)
4. Disconnect the power cable from the floppy disk drive that you wish to remove. (Refer to Figure 5.2.6.)
5. Remove the four (4) mounting screws on the bottom of the FDD that secure the floppy disk drive that you wish to remove. (Refer to Figure 5.2.7.)
6. Remove the floppy disk drive.

REPLACEMENT

NOTE: When replacing a floppy disk drive, verify that the jumper plugs and terminator have been installed correctly.

1. Reverse the procedure described under Removal.

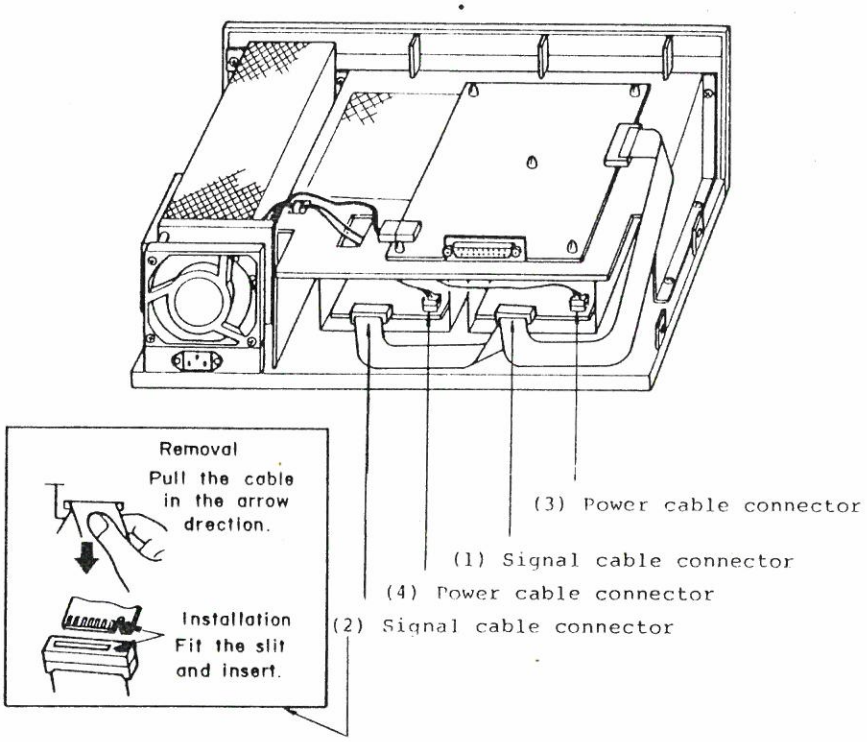


Figure 5.2.6 Removal of Floppy Disk Drive (1)

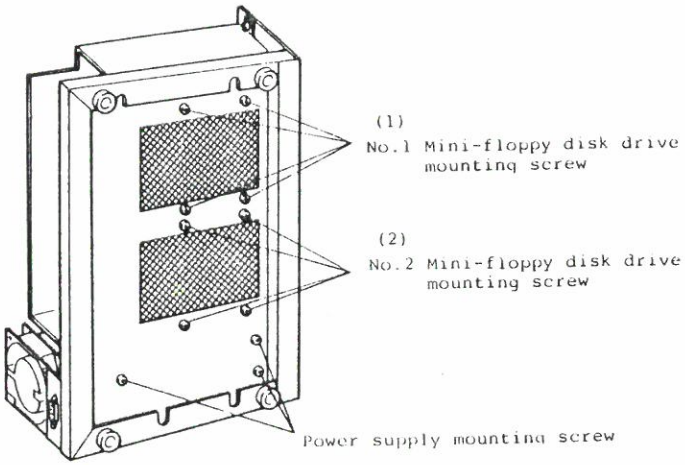


Figure 5.2.7 Removal of Floppy Disk Drive (2)

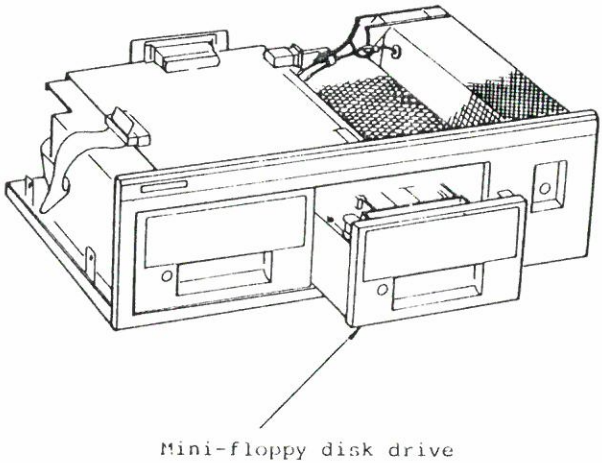


Figure 5.2.8 Removal of Floppy Disk Drive (3)

Jumper Plug Installation

The jumper plugs are installed on the floppy disk drive control board to identify the drive address and configuration. Install the jumper plugs in the positions shown in Figure 5.2.9 and Figure 5.2.11.

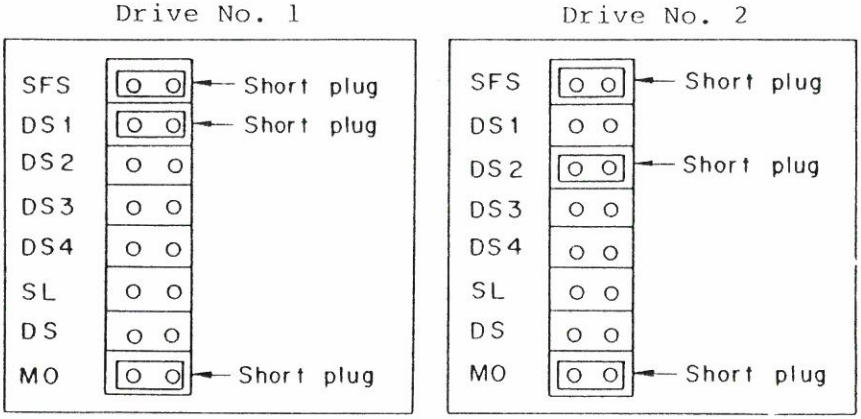


Figure 5.2.9 Jumper Plug Installation

Terminator Installation

The terminator provides terminating resistance for the floppy disk drive signal lines. Install the terminator as shown in Figure 5.2.10 and Figure 5.2.11.

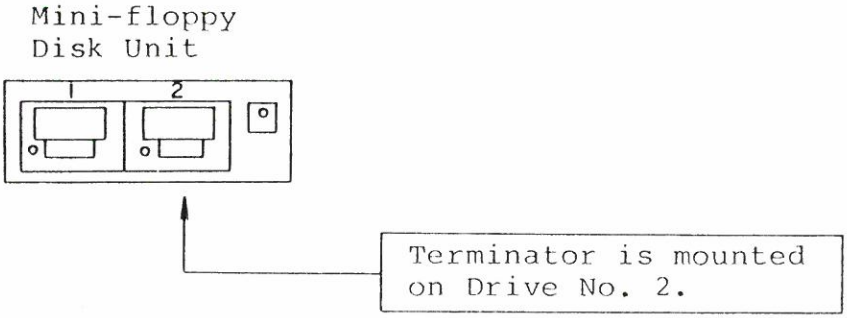


Figure 5.2.10 Terminator Installation

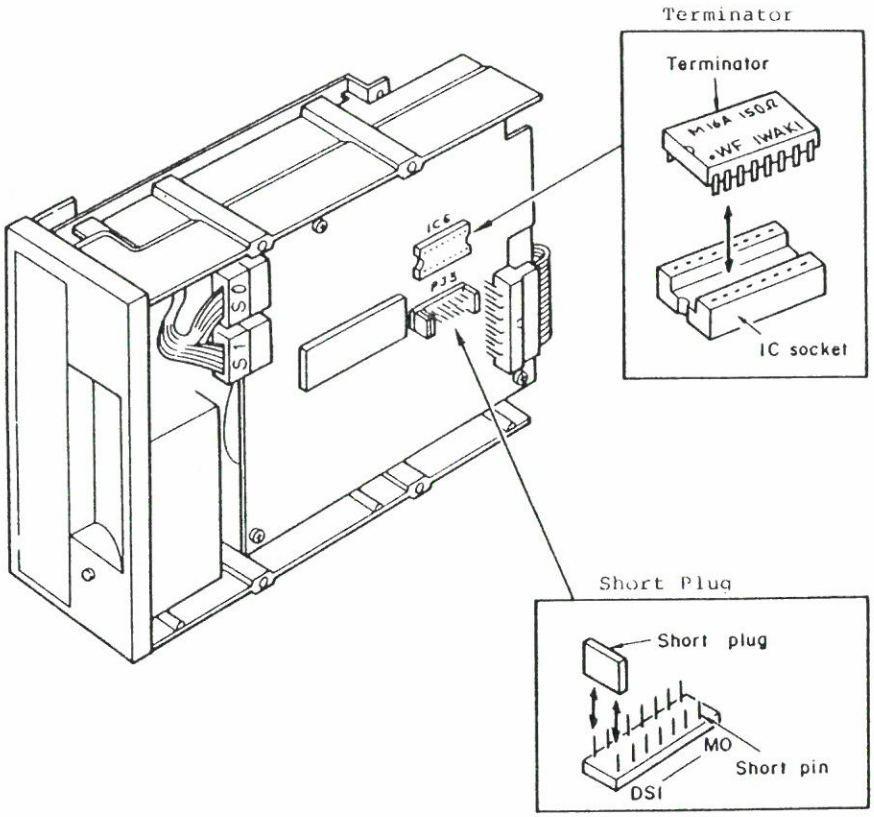


Figure 5.2.11 Location of Jumper Plugs and Terminator

5.2.5 Drive Belt

REMOVAL

1. Remove the floppy disk drive from the Floppy Disk Drive Unit. (Refer to 5.2.4.)
2. Disconnect the two (2) head connectors from the control board. (Refer to Figure 5.2.12.)
3. Remove the three (3) screws that secure the control board to the floppy disk drive and remove the control board. (Refer to Figure 5.2.12.)
4. Remove the two (2) screws that secure the motor control board to the floppy disk drive and move the motor control board out of the way. (Refer to 5.2.12.)
5. Remove the drive belt.

REPLACEMENT

1. Reverse the procedure described under Removal.

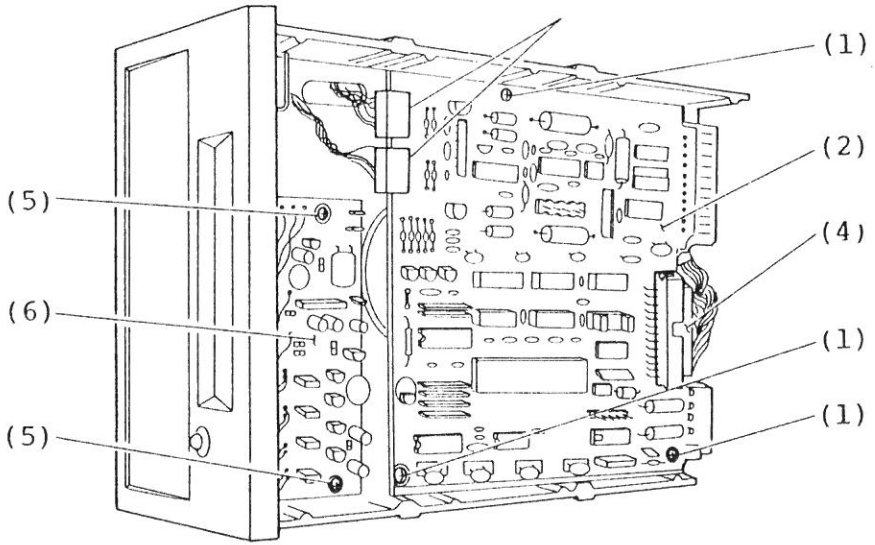


Figure 5.2.12 Drive Belt Removal 1

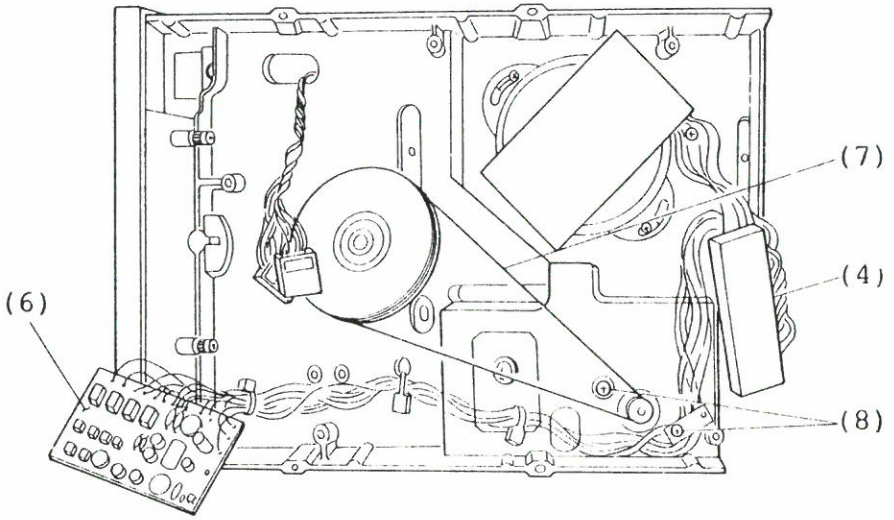


Figure 5.2.13 Drive Belt Removal 2

6. ADJUSTMENTS

6.1 CPU/Keyboard

6.1.1 Power Supply Voltages

CAUTION

Dangerous voltages exist in the transformer and fuse circuits of the T100 Personal Computer. Use extreme caution when performing the following procedure.

PROCEDURE

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 CPU/Keyboard. (Refer to 5.1.1.)
3. Remove the power supply. (Refer to 5.1.2.)
4. Remove the keyboard. (Refer to 5.1.3.)
5. Remove the PJ6 connector of the speaker cable from the CPU board as shown in Figure 5.1.7 and the two (2) screws for the shield cover as shown in Figure 5.1.6, then remove the shield cover.
6. Reconnect the PJ4 connector of the power cable for the CPU and the AC power cord, turn ON the power switch.
7. Check the DC voltages at the measurement points indicated in Figure 6.1.1 and Table 6.1.1. Voltage measurements should be made using a digital volt meter.
8. If the DC voltages are not within the specified ranges, replace the power supply.
9. Replace the shield cover, power supply, keyboard and top cover by reversing the procedure defined in steps 1 through 5 above.

Table 6.1.1 Voltage Check Points

Voltage	Specified Voltage	Measurement Point
DC +5V	+5V ± 0.25V	Across ends of capacitor C161
DC +12V	+12V ± 0.6V	Across ends of capacitor C163
DC -12V	-12V ± 0.6V	Across ends of capacitor C164

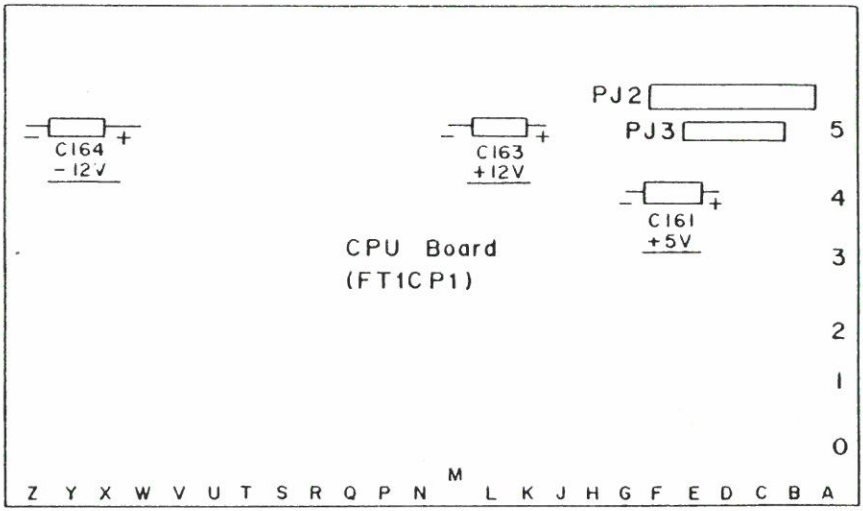


Figure 6.1.1 Measurement Points for DC Voltages

6.1.2 Sound Volume Control

PROCEDURE

An alarm is sounded to notify the operator that some condition exists which requires attention. The volume of the alarm can be adjusted by rotating RV1 which is located on the back of the T100 CPU/Keyboard.

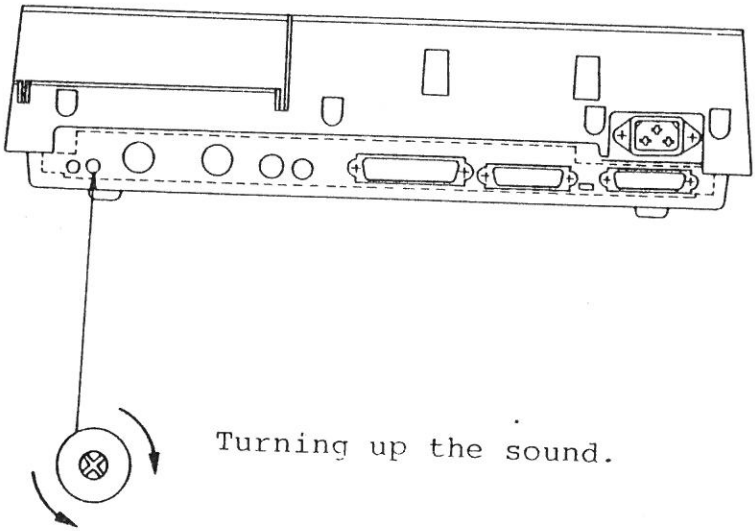


Figure 6.1.2 Sound Volume Adjustment

6.2 Floppy Disk Drive Unit (FDD)

6.2.1 Power Supply Voltages

CAUTION

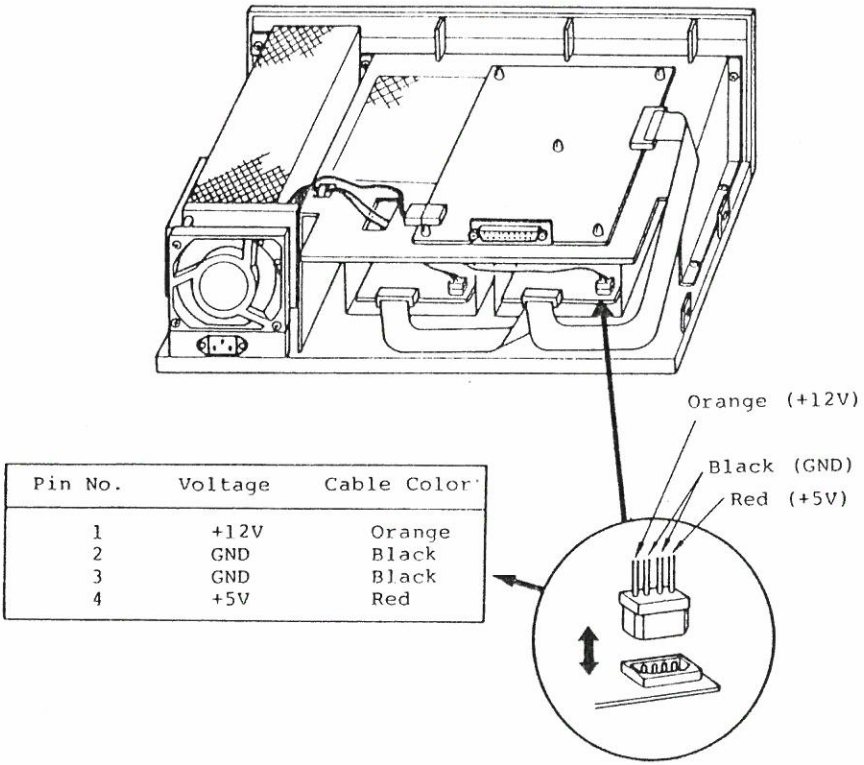
Dangerous voltages exist in the transformer and fuse circuits of the T100 Personal Computer. Use extreme caution when performing the following procedure.

PROCEDURE

1. Turn OFF the power switch and disconnect the AC power cord.
2. Remove the top cover of the T100 FDD. (Refer to 5.2.1.)
3. Disconnect the power cable from the FDD. (Refer to Figure 6.2.1.)
4. Connect the AC power cord and turn ON the power switch.
5. Check the DC voltages at the measurement points indicated in Figure 6.2.1 and Table 6.2.1. Voltage measurements should be made using a digital volt meter.
6. If the DC voltages are not within the specified ranges, replace the power supply.
7. Turn OFF the power switch and disconnect the AC power cord.
8. Connect the power cable to the FDD and replace the FDD top cover and external connections.

Table 6.2.1 Voltage Measurement Points

Voltage	Measurement Point	Voltage
+ 5V DC	Pin 4 to pin 2	+5V $\pm$ 0.25V
+12V DC	Pin 1 to pin 2	+12V $\pm$ 0.6V



Pin No.	Voltage	Cable Color
1	+12V	Orange
2	GND	Black
3	GND	Black
4	+5V	Red

Figure 6.2.1 DC Voltage Check

6.2.2 Read/Write Head Cleaning

TOOLS REQUIRED

- o Applicator
- o 91% isopropyl alcohol

PROCEDURE

1. Remove the floppy disk drive from the Floppy Disk Drive Unit. (Refer to 5.2.4.)
2. Wet an applicator with 91% isopropyl alcohol and clean the read/write heads by scrubbing the surface with MODERATE pressure. After scrubbing, dry the heads with a fresh applicator.
3. Replace the floppy disk drive in the Floppy Disk Drive Unit by reversing the procedure for removal.

NOTE 1: If the head surface is dirty with black foreign matter, clean the surface until such black color has been deleted.

NOTE 2: Do not wipe the surface of head 1 too strongly: otherwise, the head may be damaged.

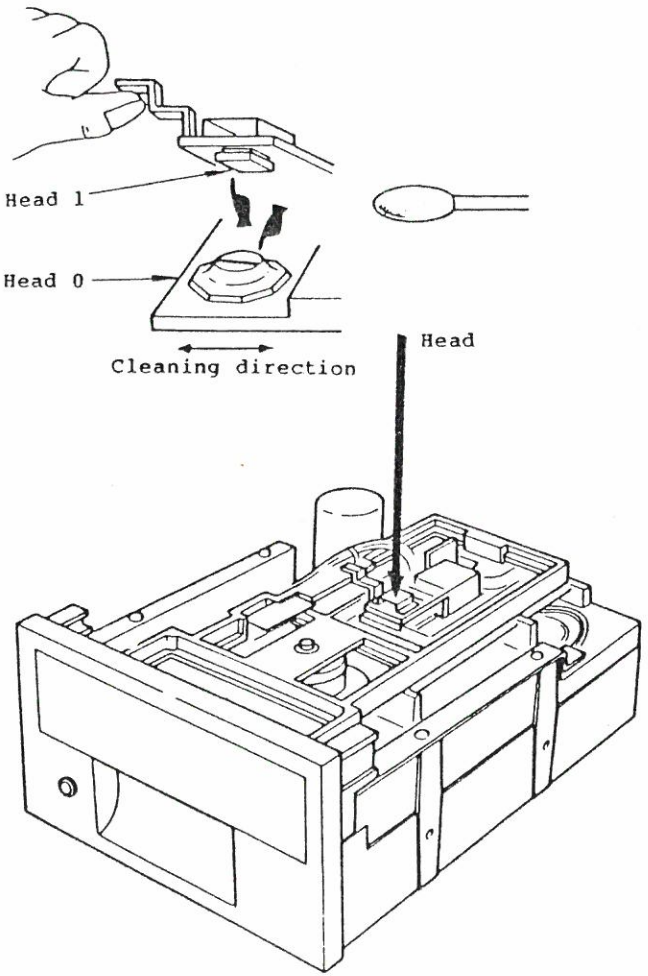


Figure 6.2.2 Head Cleaning

NOTES

7. REPLACEMENT PARTS LIST

7.1 CPU/Keyboard

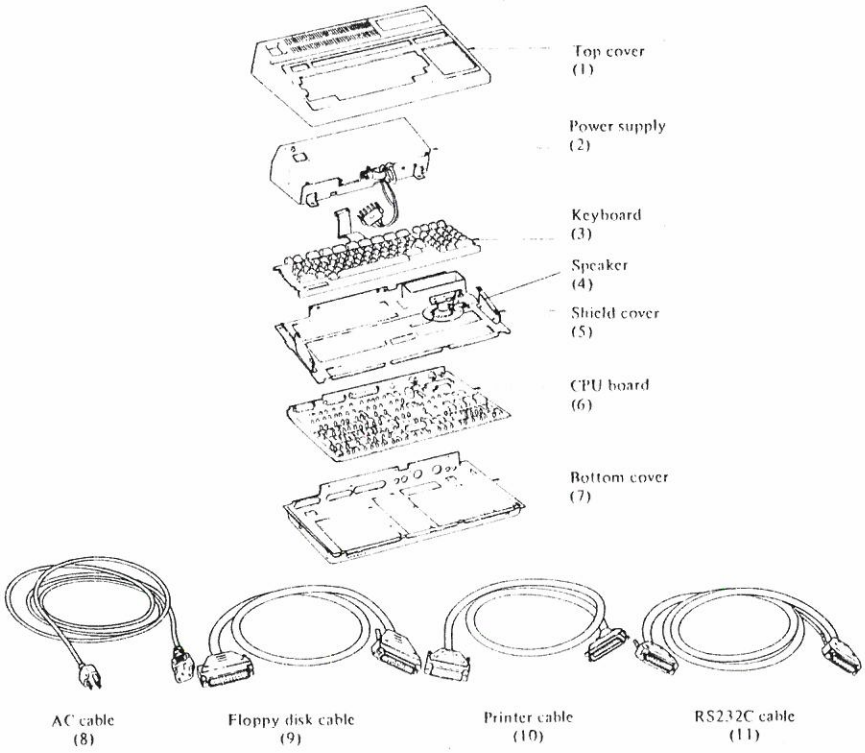


Figure 7.1 CPU/Keyboard

Table 7.1 CPU/Keyboard

Part Number	Description	Reference
T100-1200	Top Cover Assembly	1
T100-0010	Power Supply Assembly	2
T100-0060	Keyboard Assembly	3
T100-1230	Speaker	4
T100-1210	PCB Shield Cover	5
T100-0020	CPU PC Board	6
T100-1220	Bottom Cover	7
T100-1300	AC Power Cord	8
T100-1350	FDD I/O Cable	9
T100-1360	Printer I/O Cable	10
T100-1320	RS232C I/O Cable	11
T100-1330	Color Display I/O Cable	N/A
T100-1340	Green Display I/O Cable	N/A

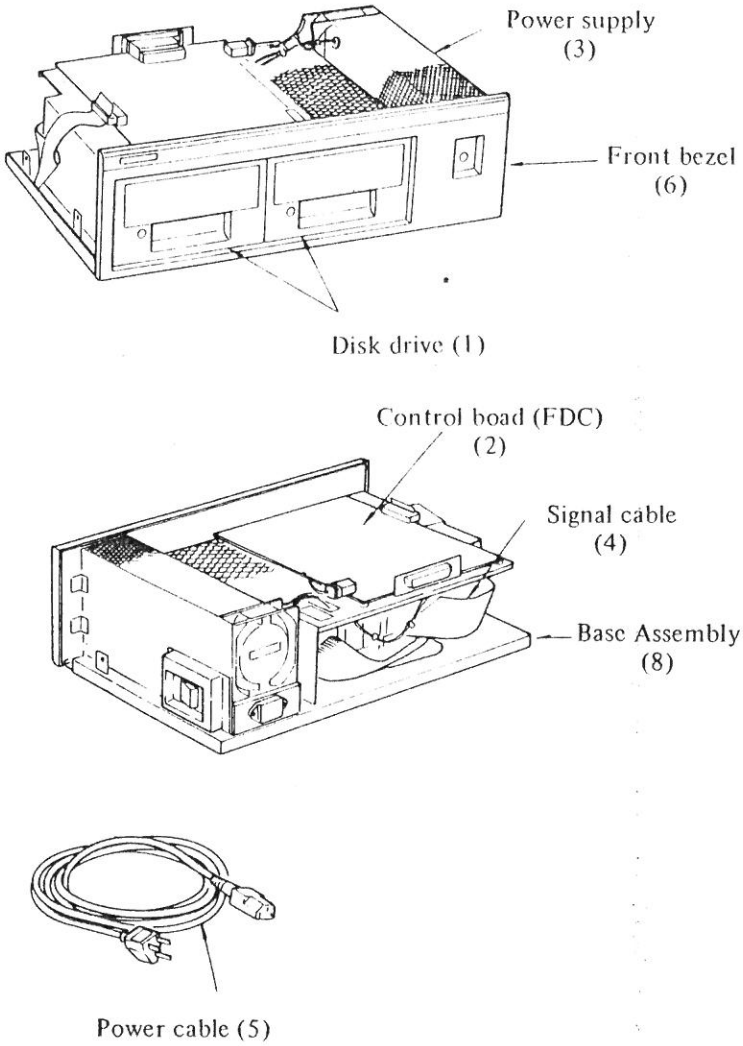


Figure 7.2 Floppy Disk Drive Unit

Table 7.2 Floppy Disk Drive Unit

Part Number	Description	Reference
T100-0040	Floppy Disk Drive	1
T100-0030	FDD Controller	2
T100-0015	Power Supply	3
T100-1310	Flat Cable	4
T100-1305	AC Power Cord	5
T100-1270	Front Bezel	6
T100-1280	Top Cover	N/A
T100-1290	Base Assembly	8

7.3 Fine Color Display

Table 7.3 Fine Color Display

Part Number	Description	Reference
T100-0050	Color Display Assembly	N/A
T100-1250	Color Display Base	N/A

7.4 Green Display

Table 7.4 Green Display

Part Number	Description	Reference
T100-0055	Green Display Assembly	N/A
T100-1260	Green Display Base	N/A

Appendix A
Error Status Code and Command List

Table A.1 Error Status Table

Device	Code	Status	Reference
ACMT	8	Normal termination	
	2	Postamble error	2
	4	Checksum error	2
	7	Read buffer overrun	2
FDD	*8	Normal termination	
	*0	FDD not ready	
	*2	ID field error	2
	*3	Seek error (Track defective)	2
	*4	CRC error	2
	*5	Write check error or file unsafe	
	*6	Delete sector detection	2
	*7	Input parameter error	
	*9	CRC error in delete sector	2
	*G	Write protected	2
PRT	F	Fault signal	
	B	Busy signal	

Note 1: * represents the drive number in the FDD status word

Note 2: Above errors are also displayed if a floppy disk or an audio cassette magnetic tape is defective.

Table A.2 FDD Command Code

Commands used in the test program are Read (86), Write (85), etc., and the command codes in the table below are shown in the [CMD. XX] on the display.

Command Code (Hex.)	Description
86	Seek & Read
C5	Seek & Write with Check
8D	Seek & Write ID
07	Return to Zero
04	Sense Drive Status
85	Seek & Write
06	Read Data
05	Write Data
0F	Seek
0D	Write ID

Appendix B
Test Program Run Times

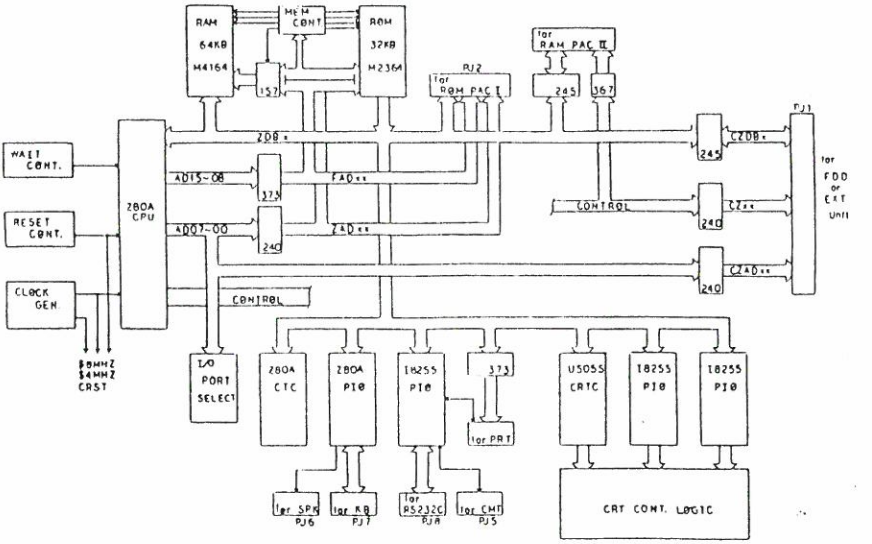
Table B.1 Standard Execution Times

Test	Test Name	Subtest	Execution Time
1	FDD	51	7 sec.
		52	2 min. 11 sec.
		53	28 sec.
		54	2 sec.
		55	1 sec.
		56	5 min. 5 sec.
		57	1 min. 45 sec.
		58	57 sec.
2	CRT/Kb	01	2 sec.
		02	8 min. 10 sec.
		03	1 min. 10 sec.
		04	1 min. 40 sec.
		05	2 min. 15 sec.
		06	18 min. 55 sec.
		07	30 sec.
		08	25 sec.
		09	1 min. 0 sec.
		10	1 min. 53 sec.
	(LCD)	01	2 min. 39 sec.
3	ACMT	01	40 sec.
		02	30 sec.
		03	XX min.
		04	XX min.
4	PRT	01	4 min. 29 sec.
		02	4 min. 29 sec.
		03	5 sec.
5	RS232C	01	2 sec.
6	SOUND	01	1 min. 28 sec.
		02	16 sec.

Table B.1 Standard Execution Times (continued)

Test	Test Name	Subtest	Execution Time
7	TIMER	01	Constant
8	BURN IN	01	24 min. 48 sec.
		02	2 min. 30 sec.
9	RAM P2	02 (32KB)	20 min. 20 sec.
	ROM P2	03 (24KB)	
A	RAM	01	39 min. 37 sec.
		02	9 min. 54 sec.
		03	9 min. 54 sec.
		04	158 min. 25 sec.
		05	10 min. 45 sec.
B	ROM	01	4 min. 54 sec.
		02	5 min. 6 sec.
		03	6 sec.
PF1	FORMAT		1 min. 48 sec.
PF2	COPY		1 min. 20 sec.

Appendix C
T100 CPU/Keyboard Schematic Diagram



REVISIONS

This manual contains the following revisions:

DATE	REVISION	REASON
12/82	1	Product release